TECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

Volume 34 — September 30, 1942 — Number 39

PUBLIC LIBRARY
OCT 3 - 1942
DETROIT

OPA Alters Ideas On 'Gas' Rationing

WASHINGTON — "Mileage rationing" is term describing OPA's new concept of gasoline rationing, for while the price control agency won out on handling nationwide rationing by its coupon system, ODT's plan for mileage control and Baruch recommendation on tire replacements play bigger role. P. 3.

Fuel Oil Rations To be 1/3 Normal

WASHINGTON—Rather than a 25% cut, OPA now plans to reduce fuel oil consumption in 30 eastern and mid-western states by one-third through its coupon rationing system, scheduled to begin around middle of October. Meantime, drive on conversion from use of fuel oil to coal grows in intensity with non-cooperators facing drastic limitation in supply. P. 3.

Oil Pooling Plan Gets 'Green Light'

WASHINGTON—A broad pooling plan for East Coast oil supplies, calling for allocation among suppliers on basis of 1941 sales position, gets WPB Chairman Nelson's certificate for protection against anti-trust action. Meantime ODT sponsors fuel oil delivery pooling plan to cut truck mileage. P. 3.

Tank Car Priority Based on War Need

WASHINGTON — WPB orders ODT to establish priorities on tank car shipments, fixing 5 classes of use. Aim is to free cars for chemicals and vegetable fats and oils, mainly at expense of automotive gasoline. ODT may operate under Old Order 7. P. 19.

BULLETINS

RETAIL PRICES

WASHINGTON—Within next few days, OPA will issue an amendment to Maximum Price Regulation No. 137 authorizing resellers to use October 1941 prices as "ceilings" for their retail gasoline prices instead of March 1942 prices, if they wish. However, the reseller will not be allowed a longer margin than he had last October.

* * *

OIL TRAINLOADS

CHICAGO—Reduction from 139 to 65 in number of routes which handle trainload shipments of oil moving into District 1, cutting out roads incapable of meeting schedules and others now loaded with other transportation, is in store following recommendation of oil-rail representatives here. New lists of routes will be supplied to refiners.

* * *

FUEL RATIONING

CHICAGO — Oil industry can't find substantiation for as drastic a cut as one-third in fuel oil consumption in Mid-West according to Frank E. Spencer, chairman of a special fuel oil committee named by District 2 marketing committee to investigate supply situation. Committee has not completed its study.

* * *

35 M.P.H. VIOLATORS

WASHINGTON — Stiff penalties for violators of the 35 m.p.h. speed limit in the nation's capital are proposed by Secretary Ickes who would cancel gasoline rations for a third speeding offense.

* * *

TRUCKERS 'VACATION'

WASHINGTON — "Vacationing" truck drivers for 3 large petroleum transporters serving Eastern Seaboard are back at work, following conference with U. S. Conciliation Director Steelman. While wage and hours were reported cause of dispute, there were some indications that the workers and union leaders were not seeing "eye to eye". Truck tie-up prevented deliveries of fuel oil here where orders were especially heavy due to OPA's Oct. 1 fill-the-tank order.

War Lays Heavy Hand On Oil Jobbers

Pushed up by rising operating costs and reduced volume, and pushed down by inflexible government price ceilings, the oil jobber is literally catching it from both ends. It's called feeling the impact of the war by some. NPN, in this issue, attempts to give a quick picture of the jobber's situation today as he finds himself in the middle of rapidly developing trend which threatens to wipe him out. What of his present? What of his future? P. 27.

'Pool' to Balance By End of Month

NEW YORK — By end of October, the East Coast cost-profit sharing "pool" will be in balance and participants will have been paid for all legitimate excess transportation expenses, according to the management subcommittee. After that, "pool" may be continued in modified form. P. 4.

Yields Change Aid From RFC Stymied

WASHINGTON — Proposals for RFC to reimburse refiners generally for reduced gasoline yields have bogged down due to OPA's apparent unwillingness to decide anything until there has been an overall reduction in yields to desired levels. RFC wants OPA to do the deciding. P. 15.

Permit Unloading Direct to Trucks

WASHINGTON — Under emergency conditions, rails and ICC are willing to waive safety rules to permit unloading tank cars direct into trucks, which in many cases saves truck mileage and time as well as unloading time. Each case will be decided on its merits; no blanket permission will be granted. P. 26.

NEWS BRIEFS

County map shows fuel oil rationing zones. P. 9.

* * *

Bureau predicts 17% drop in October 'gas' use. P. 15.

* * *

Oil plant protection is oils job, W.P.R.A. told. P. 16.

* * *

Study use of propane for breaking in plane motors. P. 16.

* * *

Grease institute announces meeting program. P. 16.

* * *

Texas may call special meeting on allowables basis. P. 18.

* * *

Full text of tank car priority system. P. 22.

* * *

ICC allows unloading from tank car direct to truck. P. 26.

* * *

Substitution rule up before Texas rails. P. 26.

* * *

Texas to California pipeline needed, Thompson says. P. 26.

* * *

Data listed for obtaining war certificates for trucks. P. 23.

* * *

Rail haul to East Coast rises to 856,710 b/d. P. 23.

* * *

Thefts of 'gas' rationing books mounts to 50,000. P. 14.

News Section	3
Washington News	5
Editor's Page	11
Refining News	15
Production News	18
Transportation News	19
War's Impact on the Oil Jobber	27
A.P.I.C. Groups	34
Statistics	37
Markets	39
Personals	48

REFINERY MANAGEMENT AND PETROLEUM CHEMICAL TECHNOLOGY EDITION—In 2 Sections, Section 1

Correctly designed and durably built Brodie Meters, like other dependable precision devices, might occasionally require some slight attention—some minor adjustment. Small trifles overlooked today may result in serious damage later. To keep stock transfers and deliveries accurately efficient—to continue serving the needs of your customers, your community and your country, keep your meters in tip-top condition. They'll continue to give you the service you desire, when you've given them the service they might require. Simplified Brodie Meter construction makes this feasible. Write today for Model X Service Manual—No. 190.

PETROLEUM METERING EXCLUSIVELY

BRODIE METERS

SINCE 1927

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

RALPH N. BRODIE CO., Inc., 950 61st Street, Oakland, California, U.S.A.

CABLE ADDRESS: "BRODICO" • *DIVISION OFFICES: CHRYSLER BUILDING, NEW YORK CITY* • *59 EAST VAN BUREN, CHICAGO* • *302 SOUTH PEARL STREET, DALLAS, TEXAS* • REPRESENTATIVES AND STOCKS IN ALL PRINCIPAL CITIES

NPN's Washington Directory of Oil Agency Headquarters

Following is a partial list and directory of governmental agencies in Washington dealing with matters affecting the oil industry: (List is as accurate as possible but is only tentative as room and phone numbers are constantly changing.)
Abbreviations code: Rm for room; Ex for phone extension.

Office of Petroleum Coordinator

New Interior Building, 18th and C Sts., N.W., Phone REpublic 1820.

Receptionist
Mrs. Rosalie E. Reid, Rm 6635, Ex 3429-4820.

Coordinator
Harold L. Ickes, Rm 6156, Ex 5000.

Deputy Coordinator
Ralph K. Davies, Rm 6654, Ex 3831.

Assistant Deputy Coordinators
Robert E. Allen, Rm 6637, Ex 4401.
Elmer E. Batzell, Rm 6070, Ex 2181.
Everett Lee De Golyer, Rm 6631, Ex 4459.
Bruce Brown, Rm 6623, Ex 2066.

Special Assistants
Dr. John W. Frey, Rm 7424, Ex 4272.
Joseph A. Fanelli, Rm 6642, Ex 4104.
Howard T. Mather, Rm 5426, Ex 4626.
J. Elmer Thomas, Rm 6622, Ex 4735.
William F. Huff, petroleum consultant, Rm 5216, Ex 3052.

Executive Officer
Glenn D. Thompson, assistant executive officer, Rm 6412, Ex 4634.
E. J. Skidmore, special assistant to the executive officer, Rm 6415, Ex 4363.

WPB Priority Consultant
Robert B. Shirk, chief priority specialist, Rm 7340-42, Ex 4616-17.

Information Division
Gordon Sessions, director, Rm 7515, Ex 2621.
Herbert A. Yocom, assistant director, Rm 7515, Ex 4650.

Facility Security Division
W. D. Mason, director, Rm 5213, Ex 4172.

Foreign Division
James T. Duce, Rm 4442, Ex 4417.
W. D. Crampton, associate director, Rm 4448, Ex 4788.
C. S. Snodgrass, associate director, Rm 4450, Ex 4789.

Legal Division
J. Howard Marshall, chief counsel, Rm 6647, Ex 4100.
Robert E. Friedman, assistant chief counsel, Rm 7510, Ex 668.
David M. Hudson, assistant chief counsel, Rm 7510 A, Ex 793.
George A. Wilson, Rm 5208 A, Ex 4898.
Justin R. Wolf, Rm 6070, Ex 2130-4822.

Marketing Division
Robert T. Collier, director, Rm 4257, Ex 4646.
Paul A. Best, assistant director, Rm 4258, Ex 3518.
Joseph H. Ellender, chief of motor fuel section, Rm 4256, Ex 4434.
D. C. Arnold, chief of asphalt section, Rm 4244, Ex 2787.
Howard C. Cooper, chief of lube oils and miscellaneous products, Rm 4344, Ex 4313.
Robert MacMillan, chief of equipment section, Rm 4038, Ex 2781.

Materials Division
Greer W. Orton, director, Rm 5312, Ex 4623.

Natural Gas and Natural Gasoline Division
E. Holley Poe, director, Rm 7314, Ex 4860.
Paul M. Raigorodsky, assistant director, Rm 7314, Ex 4774.
James E. Pew, chief of natural gasoline section, Rm 7318, Ex 4871.
Charles M. Webber, chief of liquefied petroleum gas section, Rm 7320, Ex 3350.
Robert W. Ducker, chief of natural gas section, Rm 7322, Ex 2524.
Thomas R. Weymouth, consultant, natural gas section, Rm 7326, Ex 4860.

Petroleum Supply Division
Robert Lee Minckler, director, Rm 5210, Ex 4834.
R. C. Sauer, assistant director, Rm 5210, Ex 2083.

Production Division
Donald R. Knowlton, director, Rm 7410, Ex 4861.
Ralph J. Schilthuis, assistant director, Rm 7410, Ex 2907.

Refining Division
Phillip M. Robinson, acting director, Rm 5260, Ex 4786-87.
Robert B. Cragin, chief of supply section, Rm 5024, Ex 3237.
Douglas P. Bailey, chief of operations section, Rm 5040, Ex 4877.
Max B. Miller, chief of construction section, Rm 7443, Ex 4500.
George Parkhurst, chief of facilities section, Rm 5254, Ex 3941.
Dr. Mandelbaum, acting chief of process development section, Rm 5255, Ex 4619.

Research Division
Edward B. Swanson, director, Rm 7315, Ex 649.

Tanker Coordinating Board
Walter R. Lange, tanker control expert, Rm 5423, Ex 4744.
Joseph Winterberger, chief supply technician, Rm 5425, Ex 4437.

Division of Reserves
W. B. Heroy, director, Rm 7516, Ex 4459.

Transportation Division
Maj. J. R. Parten, director, Rm 5412, Ex 4418.
C. W. Kinsolving, assistant director, Rm 5414, Ex 3557.
Lee R. Cowles, assistant director, Rm 5411, Ex 3658.
Donald A. Sears, chief of pipeline section, Rm 5418, Ex 4833.
Boyd Wilson, chief of tank car section, Rm 6621, Ex 4620.
S. D. Archbold, chief of inland waterways section, Rm 5045, Ex 4333.
Arch Turner, chief of motor transportation section, Rm 5419, Ex 4300.

Liaison
Gen. Walter B. Pyron
Liaison agent between Army Department and OPC, Phone RE 6700, Ex 6044, Rm 3062, Munitions Bldg., Constitution Ave. between 19th and 21st Sts.

War Production Board

New Social Security Bldg., 4th & Independence Ave., S.W., Phone REpublic 7500.
Donald M. Nelson, chairman, Rm 5055, Ex 2113.
William L. Batt, vice-chairman, Rm 5055, Ex 2212.
Stephen E. Fitzgerald, director, division of information, Rm 5525-F, Ex 5242.
Ernest Kanzler, director general for operations, Rm 5300, Ex 74642.

Liaison, WPB-OPC-RFC
R. Otis McClintock, Rm 5193 A, Ex 71181.

Rubber Administrator

Social Security Bldg., 4th & Independence Ave., S.W., Phone REpublic 7500.
William M. Jeffers, administrator, Rm 5418, Ex 5926.

Office of Price Administration

Federal Office Bldg., No. 1, 2nd and D St., S.W., Phone REpublic 7500.
Leon Henderson, administrator, Rm 4130, Ex 5586.
Dr. J. K. Galbraith, deputy administrator in charge of price, Rm 5131 B, Ex 5203.
W. Page Keeton, chief of petroleum and petroleum products branch, Rm 1606 Temp. D Bldg., Ex 6348.
Michael Joel, administrative officer petroleum section, Rm 6313, Ex 5389.
George Doffing, price executive of petroleum section, Rm 6305 A, Ex 5388.
Joseph H. Salmon, associate price executive, Rm 6304 A, Ex 6376.
Robert Collacott, head of marketing section, Rm 6313, Ex 6636.
Edward W. Doherty, chief of economic analyst unit, Rm 6316, Ex 6370.
Peter Jensen, head of fuel oils unit, marketing division, Rm 6314, Ex 4916.
Leo Van Herpe, chief of fuel section accounting division, Rm 2215, Ex 5539.
Watson B. Joyes, head of crude oil production section, Rm 6315, Ex 4403.
Joel Dean, chief of fuel rationing division, Rm 258 Temp. D Bldg., Ex 73411.

U. S. Tariff Commission

7th & F St., N.W., Phone NAtional 3947.

Petroleum Accounting Section
Kenneth L. Stone, chief, Rm 155, Ex 123.

Office of Defense Transportation

Interstate Commerce Commission Bldg., Constitution Ave. & 78th St., N.W., Phone REpublic 7500.
Joseph B. Eastman, director, Rm 5136, Ex ICC 719, 3527.
Fayette B. Dow, director of pipelines, tank cars, tankers and tank trucks, Rm 5132, Ex 73207.
J. G. Scott, counsel, Rm 5418, Ex 2460.

Motor Transport Division
John L. Rogers, director, Rm 4211, Ex 2297.
Sam F. Niness, chief of petroleum carrier section, Rm 4221, Labor Bldg., Ex 6351.
W. T. Cumming, chief of vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72731.
T. L. Preble, consultant, vehicle maintenance section, Rm 4215, Labor Bldg., Ex 72775.
R. D. Thomas, chief of tire maintenance section, Rm 4209, Labor Bldg., Ex 71446.
H. H. Kelly, chief of allocation section, Rm 4311, Labor Bldg., Ex 73027.
Leon F. Banigan, assistant to Kelly, Rm 4311, Labor Bldg., Ex 73027.

Congress

Congressional Oil Investigating Committee
Rep. W. J. Cole, Jr., chairman, New House Office Bldg., Rm 1535, Ex 699.

Senate Oil Shortage Investigating Committee
Sen. Francis Maloney, chairman, Senate Office Bldg., Rm 354, Ex 1196, Phone NAtional 3120.

Petroleum Industry War Council

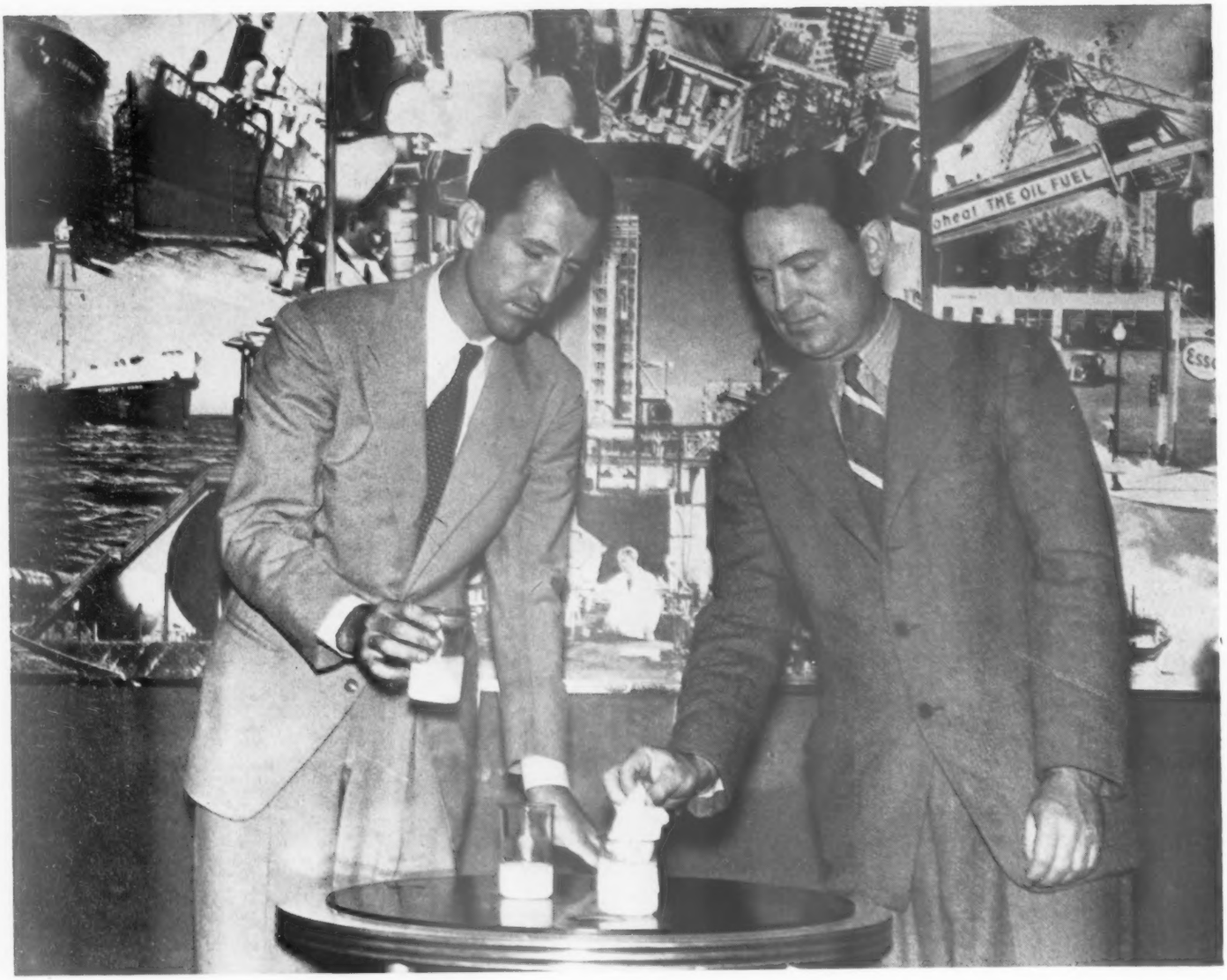
Rm 919 Commonwealth Bldg., 1625 K St., N.W., Phone DIstrict 2820.
William R. Boyd, Jr., chairman.
Allan H. Hand, secretary-treasurer.

U. S. Maritime Commission

Commerce Department, Phone REpublic 6620.
B. B. Jennings, director of tanker operations, War Shipping Administration, Rm 4309, Ex 87, 88, 89.

OIL IS AMMUNITION — USE IT WISELY!

NATIONAL PETROLEUM NEWS—September 30, 1942—Vol. XXXIV—No. 39
Published every week at 1213 West 3rd St., Cleveland, Ohio, U.S.A. Subscription rate $5.00 per year in United States, Mexico, and Pan-American countries; $6.50 Canada and foreign countries. Entered as second class matter Jan. 17, 1910 at Cleveland, O., post office under act of March 3, 1879, by The National Petroleum Publishing Co.
Copyright 1942 The National Petroleum Publishing Company.



Robert McKee Thomas (left) and William J. Sparks, the Jersey Standard team which invented Butyl rubber

Discoverers of Butyl Rubber

● A Hoosier and a Texan are the discoverers of Butyl rubber—born in the laboratory of the Standard Oil Co. of New Jersey.

Dr. William J. Sparks, the Hoosier, and Robert McKee Thomas, the Texan, are both Jersey Standard research chemists and have both been interested in the synthetic rubber field for some time.

Mr. Thomas, although born in Texas, spent his boyhood in Virginia and was graduated with a degree in chemistry from Virginia Polytechnic Institute in 1929. He then joined the staff of the Jersey company and for the past eight years has concentrated on high molecular weight hydrocarbon polymer compounds, taking out numerous patents in this field. He is active in the A.C.S. and is a frequent contributor to scientific journals.

Dr. Sparks took his Bachelor and Master degrees at Indiana University in inorganic and physical chemistry, and thence proceeded to the University of Illinois for his Ph. D. Following this, he worked successively for Sherwin-Williams, Chrysler Corp., and Du-Pont, throwing in a stint as consultant in chemistry at Indiana U. at the same time. He then joined the Jersey company, resigned to take an importance post with the Department of Agriculture, finally joined Jersey Standard to pursue the work which led to the invention of Butyl rubber.

NATIONAL PETROLEUM NEWS

VOLUME 34 WEDNESDAY, SEPTEMBER 30, 1942 NUMBER 39

OPA to Limit Fuel Oil Use By One Third

NPN News Bureau

WASHINGTON—OPA's decision to restrict fuel oil consumption to 33 1/3% of normal in 30 eastern and mid-western states was contrary to recommendations of OPC which believes that the oil industry will come much closer than that to supplying fuel oil demand.

Under the Minckler plan, developed by OPC and the industry, it is anticipated that there will be a deficit of only 18% in normal fuel oil requirements of the rationed area. OPC officials have said several times that the deficit wouldn't exceed 25%. And OPA had accepted that figure, until recently.

But OPA now feels that these estimates were too optimistic, that it would be better to make a deep cut in the fall season than later when it is colder. So, OPA is "playing it safe".

Part of OPA's Plan

Also, a deep cut now is part of OPA's plan to force householders to insulate their homes or convert to coal.

The 33 1/3% cut is an overall average. Actually OPA expects about one-fourth of the oil-heated homes in the 30-state area will be cut more than 33 1/3%. Some as much as 40% or more.

In other words, the 33 1/3% cut applies only to a house that meets OPA's standard of insulation. Super-insulated homes that exceed OPA's standard may be cut only 15% while drafty, poorly-insulated houses will be cut considerably deeper than 33 1/3%. And OPA is doing this deliberately to force householders to take steps to prevent heat-loss.

O'Leary States Policy

This policy of OPA was stated by Deputy Administrator O'Leary, in charge of rationing, as follows:

"The man who improves the thermal efficiency of his house—that is, insulates it and installs weather-stripping, storm doors and windows, and overhauls his oil burner—is going to be rewarded in added comfort," the rationing head added, "because the precise percentage of reduction for an individual house will depend upon the efficiency with which it uses oil.

"If the thermal efficiency of the

(*Continued on p.* 8)

Truck, Car Tire Quotas Cut for October

NPN News Bureau

WASHINGTON—October quotas of passenger car and truck tires announced by OPA are less than the September rationing allowance, except new tires for passenger cars with a List A eligibility.

The quota for new passenger car tires is 60,676, compared with 38,297 for September.

Total of Grade II new tires for certain classes of war workers is 98,755 against 115,544; and recapped tires or recapping services, 457,561 against 486,468. Passenger cars are allowed 315,138 inner tubes as against 333,450.

Allots Fewer Truck Tires

The new truck tire quota for October is 202,840 compared with 239,445, for September, while the allotment of recapped tires and recapping services for trucks is 238,973 against 262,258, and the inner tube quota 225,620 against 262,261.

Oil Pooling Plan Gets 'Green Light'

NPN News Bureau

WASHINGTON — OPC and the oil industry have been given the "green light" on plans for pooling all East Coast supplies of gasoline, kerosine and fuel oils and apportioning these supplies among primary suppliers in accordance with their 1941 sales position in the East.

WPB Chairman Nelson has certified that this joint action, increasing efficiency in use of transportation facilities and terminals, is necessary to the war effort so is exempt from anti-trust laws.

Plan, as approved, is the same as outlined in NPN, Sept. 23. It provides for designating certain terminals to supply certain areas, with common use of these terminals by all primary suppliers. Specific sources for each supplier will be designated.

Administration of plan is in hands of industry committees, subject to supervision by OPC. While the committees will "suggest" schedule of supplies, etc., action will be taken by OPC.

ODT Pools Tank Wagons

Meanwhile, Office of Defense Transportation is sponsoring a program for pooling of tank wagon deliveries of fuel oil (this is not covered in OPC's plan). Idea is to divide consuming areas into zones

(*Continued on p.* 6)

OPA 'Gas' Rationing Concept Changes to Mileage Control

By O. H. KNIGHT, NPN Staff Writer

WASHINGTON—Although Price Administrator Henderson won a major behind-the-scenes struggle in gaining control of nationwide gasoline rationing which starts about Nov. 22, OPA apparently is changing its entire concept of gasoline and tire rationing by devising a plan to give each of 27,000,000 motorists enough gasoline and tires to drive his minimum necessary mileage each year.

The terms "nationwide gasoline rationing" and "tire rationing" —until recently separate and distinct components of a national war economy—are being replaced by a new one, "mileage rationing".

Mileage rationing is the name of the new program announced by OPA on Sept. 27 which is a consolidation of nationwide rationing of gasoline on the same basis as the eastern coupon system and tire rationing to control automobile use according to essentiality of use.

It is under this new mileage rationing plan that OPA is working on means of providing tires for the nation's cars.

May Take 6 Months

But the time when tires will be available is uncertain—some people say by the end of the year, others say it will take six months to polish up the new program which will call for a complete reversal of policy in the midst of a pressing rubber shortage which can spell victory or defeat in this war.

According to well-informed sources, the plan most favored now calls for registration of motorists with local ration boards who will determine the mileage each is entitled to for a year.

Plan Still 'In the Rough'

While the plan still is "in the rough," a highly essential driver such as a doctor or a police patrol squad probably would be given a first-line tire, whereas the ordinary motorist who does not depend upon his car for a living and whose use of a car is less essential to the community might be given something like an all-reclaim recap.

In between the highly essential drivers and the ordinary motorist would come drivers entitled to a good grade of camelback for recapping, a grade II tire, or an all-reclaim tire.

The time when the tires will be available is uncertain—some people say perhaps by the end of the year,

(*Continued on p.* 5)

P.I.W.C. Member Hits Rationing; Jeffers Answers

NPN News Bureau

CLEVELAND — Rubber Director Jeffers ordered the extension of the present easttern gasoline coupon rationing system in order to save time, according to a wire Mr. Jeffers sent to a member of P.I.W.C. Mr. Jeffers said it seemed logical to extend the eastern program to avoid delay. His wire was in response to an earlier wire from the P.I.W.C. member. Texts of both wires follow:

From the P.I.W.C. member: "Nationwide gasoline rationing is a move so drastic in my opinion that it will not only put thousands of merchants out of business including oil marketers but will slow down war production by paralyzing essential transportation. My observation is that non-essential driving is now almost eliminated and after studying the Baruch committee report feel that still further careful study and surveys should be made to see if some other method will not obtain the required objective without the extension of gasoline rationing."

Reply from Mr. Jeffers: "Your wire. I am more familiar with this program as it affects territory beyond the eastern states than I am in the East. So far as I am able to determine the rationing in effect in the Eastern Seaboard is working out fairly well. In order to get the rationing in effect with as little delay as possible it seemed to me logical to extend the eastern program to all parts of the country. It is not the intention to hamper essential driving in any territory."

Extra Transportation Cost 'Pool' in East May Be 'Out of the Red' by End of October

NPN News Bureau

NEW YORK—Participants in the East Coast cost-profit sharing "pool" will have recovered their excess transportation expenses on shipments into District 1 by the end of October this year if price increases still in effect are left unchanged and if volume of sales does not decrease more than anticipated, according to the Extra Transportation Expense Managing Subcommittee set up under authority of the "Plan for the Equitable Sharing of Revenues and Extra Transportation Expenses".

As of July 31, 1942, a net uncompensated balance of $31,333,923.05 existed.

Costs Top $95 Million

Total *extra* expenses incurred in moving petroleum to the East Coast by other than normal methods was $95,718,540.70 between Sept. 4, 1941 (date the pooling plan became effective) and Aug. 1, 1942 (effective date of Reconstruction Finance Corp.'s plan for compensating oil companies for extra transportation and product cost expenses).

The new RFC plan, handled through its subsidiary Defense Supplies Corp., supersedes the "pool" insofar as reimbursing companies for excess transportation expenses on certain products to the East and in addition reimburses them for purchasing products in higher-priced markets (*NPN Sept. 2, p. 3*). This latter was not covered by the "pool".

Future of 'Pool'

When the transportation pool is in balance, there is a possibility that it may be continued in modified form to compensate for certain extra expenses not covered in the present financing plan administered by DSC.

If continued, it would mean a continuance also of all or at least part of the present OPA-approved price increases in District 1. "Pool" participants have been advised by OPA that presently-authorized price increases, effective since Aug. 5, 1942, will probably be continued until the "pool's" debts are liquidated.

How 'Pool' Works

Approximately 30 participating oil companies pay into the "pool" the per gallon amount of price increases authorized by OPA on various products multiplied by the number of gallons of each product sold within District 1 (17 eastern states and the District of Columbia).

This per gallon amount has varied since OPA has from time to time ordered various changes in the permitted increases by amendment to Price Schedule No. 88. Although the increases in maximum prices permitted by OPA have not always been in accordance with preference of the oil industry in the East, they have been calculated to balance out in dollars the estimates of the expenses with the forecasts of sales volumes. Increases authorized in District 1 were as follows:

	Per Gallon Gasoline	Per Gallon Kerosine	Per Gallon Distillates	Per Barrel Fuel oil
January 21, 1942	0.3c	...	...	...
March 26, 1942	0.5c	0.4c	0.4c	20.0c
April 29, 1942	0.4c	...	0.2c	25.0c
June 29, 1942	2.5c	2.0c	2.0c	...
Total	3.7c	2.4c	2.6c	45.0c

Then, effective Aug. 5, 1942, OPA ordered reductions in price increases in District 1.

The difference between the total of the price increases authorized on each product up to Aug. 5 and the reductions ordered effective that date is the amount now being paid into the "pool" by its participants on each gallon sold. This amounts to:

Gasoline	1.2c per gal.
Kerosine	1.5c per gal.
Light fuel oil	1.5c per gal.
Heavy fuel oil	30.0c per bbl.

These amounts must be paid into the "pool" by all participants on all sales within District 1 regardless of whether or not the full amount of the price increase was collected by "pool" members at the time of sale. Because of competitive conditions, the full amount of the increases permitted has not always been collected.

From the "pool", then, participating companies are reimbursed for extra expenses of transporting oil to the East by other than normal methods.

Each participating company submits its claim for reimbursement for extra transportation expenses and the books are all kept by an independent auditor, Price, Waterhouse & Co., New York. Broadly, the companies' claims are based on the per gallon difference in their cost of transporting petroleum into District 1 by emergency methods—tank car, barge, truck, pipeline, etc.—and the cost of transporting it in their normal methods, usually tanker.

Governmentally sponsored, the "pool" was designed to encourage the use of substitute transportation methods in meeting the East Coast "oil shortage"—actually a transportation shortage caused by sinkings and diversion to military service of the oil industry's tankers.

Burden on Companies

Since the inception of the "pool", its participants have carried a huge financial burden. Between Sept. 4, 1941, and Feb. 28, 1942, extra transportation expenses amounted to over ten million dollars, while revenue received from OPA-approved price increases amounted to only $2,044,030.02. Because OPA-approved price increases were inadequate for quick reimbursement of excess costs, the participating companies during this period—and there were far fewer than 30 companies in the "pool" during its early stages—carried on their books a loss of around $8,000,000. During March, 1942, excess costs amounted to $9,412,256 and revenue from the price increases amounted to $3,058,730. This added over $6,000,000 to the $8,000,000 already absorbed during the previous six months.

Each month, revenue failed to keep pace with excess expenses until the "pool" participants were in the red for a total of roughly $34,660,000. Finally, on June 29, OPA granted larger price increases than any previous, and the "pool", in July, immediately reflected the higher prices when revenue exceeded extra expenses for the first time since the "pool" was inaugurated. About $5,000,000 more in revenue was credited to the "pool" than the $23,549,354.68 in excess costs during that month (*see table*).

Says New York Tire Dealers Have 10-25 Year Supply

NPN News Bureau

CLEVELAND—Bulletin of the National Highway Users Conference carried the report that New York tire dealers have stocks on hand which will last from 10 to 25 years at present rate of rationing. One dealer, the Westminster Tire Corp., the bulletin said, has 80,000 passenger car tires on hand—enough to last for 27 years since the company's sales are only 250 tires a month under rationing.

At the same time, the bulletin reported a statement credited to a Goodyear official that tires are good for only 4 or 5 years. Prior to rationing, said the bulletin, tires kept in stock for 18 months were "taken back to the factory and scrapped or stamped as seconds".

Statement of Revenue and Expenses Under "Plan for the Equitable Sharing of Revenue and Extra Transportation Expenses"

Period	Expenses	Revenue	Uncompensated Balance For Month	Uncompensated Balance Net Accumulated For Period
Sept. 4, 1941 thru Feb. 28, 1942	10,188,660.11	2,044,030.02		8,144,630.09
Mo. of March 1942	9,412,256.87	3,058,730.44	6,358,233.44	14,483,313.15
Mo. of April 1942	13,198,865.48	8,611,093.78	4,587,771.65	19,095,152.34
Mo. of May 1942	18,274,334.30	11,544,659.77	6,729,674.53	26,079,210.82
Mo. of June 1942	21,095,069.31	12,250,651.46	8,844,417.85	35,231,884.93
Mo. of July 1942	23,549,354.68	28,671,961.22	*5,122,606.54	31,133,923.05
Total for Period	95,718,540.70	66,181,126.69		31,333,723.05

(*Indicates red figure.)

Total expenses for the period Sept. 4, 1941 thru July 31, 1942 amounted to	95,718,540.70
Total revenues for the same period amounted to	66,181,126.69
Leaving an indicated uncompensated balance for the period of	29,537,414.01
The net uncompensated balance at July 31, 1942 is	31,333,923.05
The difference of	1,796,509.04

between the net **uncompensated balance** of $31,333,923.05, which is the actual amount due the participants at July 31, 1942, and the indicated uncompensated balances by months shown above is due to adjustments in accounts of participants made by the Auditors (Price, Waterhouse & Co.) and reflected in reports of subsequent months but which were not reflected by adjusting the prior individual monthly statement to which the adjustment applied.

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

WASHINGTON BUREAU, 1034-36-38 National Press Bldg. ● Telephone National 3477 ● A. M. Petty, News Editor and Chief of Staff

Notify All Parties Before Taking Out Equipment—Davies

WASHINGTON — OPC has amended Recommendation 30 to provide that property owners, as well as service station operators, should be notified whenever suppliers intend to remove equipment from premises.

"In many cases, operators are closing service stations because they are entering the Army or going to some other type of work," Deputy Coordinator Davies said. "Under such circumstances, the property owner should be given the opportunity of buying the equipment installed on the site either to operate the station himself or to lease it to another operator.

"If the land owner is not given this opportunity, the value of his property often is drastically reduced because Conservation Order M-68-c prohibits construction of new service station buildings and the installation of tanks and pumps."

Provisions Listed

OPC summarized provisions of the amendment, as follows:

Equipment means dispensing pumps and storage tanks having a capacity of more than 65 gal.

"No supplier may remove equipment from a station, regardless of the reason, without making his intention known in writing to the operator at least 30 days before removing the equipment or until he has received the operator's written consent.

"An operator receiving a written notice of the intention to remove equipment shall have the option to buy the equipment. The option shall run for at least 30 days, and not more than 45 days, during which time the operator either may purchase the equipment or procure another person to purchase it.

"During the option period, the operator may use the equipment.

"If the operator does not wish to buy the equipment, the property owner shall be given an option in writing to purchase or arrange for the purchase of the equipment. The owner's option period shall be for a period of not less than 15 days.

"The equipment shall be sold either to the operator or the property owner, as the case may be, at a reasonable price based on original cost less reasonable depreciation.

"If neither the operator nor the property owner exercises the option, then the supplier may remove his equipment."

NPN Gives Digest Of War-Oil Orders

With this issue NPN prints its first digest of all orders, recommendations, directives, etc., pertaining to the oil industry. The following listing covers the period Sept. 21-26, inclusive. The "digest" will be a weekly feature.

OPA

Gasoline rationing—OPA lifted the 5-gal. per month limit on special rations to deliver motor vehicles after sale, in Amendment 9 to Ration Order 5A; issued Sept. 21, 1942; effective Sept. 26, 1942.

* * *

WPB

Toluene, synthetic nitration grade—Permission to exchange technical data on manufacture was extended to include persons having technical information, as well as manufacturers, in WPB's Amendment 1 to Certificate 1; issued Sept. 25, 1942.

Tank cars—Priorities on shipments were established by WPB, and ODT was directed to execute the order, in Certificate of Necessity for Priority Action No. 1; Tank Cars; issued Sept. 16, 1942.

Domestic space heaters—Restrictions do not include direct fired gas unit heaters, WPB ruled in Amendment 1 to Limitation Order L-173; issued Sept. 19, 1942.

* * *

Rubber Administrator

Gasoline rationing — OPA was authorized to start nationwide rationing using the same basis as in the East, and ODT was given the job of reviewing the program, in Rubber Director Jeffers' first directive; issued Sept. 25, 1942.

OPA 'Gas' Rationing Concept Changes to 'Mileage Control'

(*Continued from p.* 3)

others say it will take six months to polish up the new program which will call for a complete reversal of OPA policy.

Rubber Director Jeffers ordered OPA to use the eastern coupon system on a nationwide basis.

In the nationwide gasoline rationing program, OPA will use the eastern coupon system whereby the consumer has a certain amount of coupons given him by his local board for a year's driving. Everytime he buys gasoline, he must surrender one or more coupons to the service station.

Coupon System Explained

To replenish his supply, the service station in turn must surrender the coupons to his supplier and so on up the line. This is called the "flow back" principle. Gasoline may be delivered only upon submission of coupons of which there are eight types.

The "A" book contains 48 coupons valued at 4 gal. each, good for one year, gives 2880 miles of driving. "B" book is supplementary, containing 16 coupons also of 4 gal. each to provide the difference between 150 miles of occupational driving monthly allowed by the "A" book and 470 miles monthly, good for periods ranging from 3 to 12 months.

Driving of more than 470 miles monthly is covered by the "C" book, good for 3 months only, and issued only to 14 preferred classes.

The "D" book is for motorcycles, contains 48 coupons valued 1.5 gal. each.

"S-1" and "S-2" books are "service rations" issued to trucks, buses, taxicabs, ambulances and hearses. Enough coupons, each worth 5 gal., will be issued to commercial vehicles to cover specified mileage requirements.

"E" and "R" coupon books are for non-highway purposes. "E" is for smaller equipment and is worth 1 gal., while "R" is for larger equipment and is good for 5 gal.

Judging from OPA's consolidation of tire and gasoline rationing and the report of OPA's plans for civilian passenger car tires, it would seem that ODT Director Eastman succeeded in having his point of view adopted in large measure even though he lost the controversy over administration of nationwide gasoline rationing.

The reported change of OPA plans also indicates that Mr. Eastman blocked any attempt to ration gasoline and tires from a commodity angle only, apart from the broader transportation aspects.

Mr. Eastman also won another concession. He is to study the effect of rationing on transportation and report his findings to OPA.

An OPA official, emphasizing that the new tire plans are still being drawn up and the type of tire to be given each grade of motorist has not been determined yet, summarized the new viewpoint in these words:

"We have a new conception of the tire and gasoline rationing. We used to say how many tires would be provided to keep so many cars going and name the cars. The plan now is to keep all cars in operation. We are rationing mileage—not commodities."

OPA Reverses Its Stand

The reversal of OPA's stand can be traced directly to the Baruch committee report which recommended an immediate tire replacement and recapping program for civilian passenger cars.

The Baruch report said gasoline rationing should hold passenger car driving to an annual average of 5000 miles.

Perhaps that is one reason why OPA was given the job, since Mr. Henderson claims coupon rationing in the East has cut driving to an annual average of 5170 miles.

Mr. Henderson also said that eastern rationing has cut use of the area's 7,200,000 passenger cars by 60%, is saving 150,000,000 miles of

OPA's Fuel Rationing 'Brain Trust'

With rationing of gasoline nationally and of fuel oil in 30 states just a few weeks away, OPA's newly constituted fuel rationing division (which took the place of the fuel rationing branch) is in more intimate contact with the daily lives of the American people than almost any other agency. The division has the responsibility of apportioning out enough gasoline for essential transportation and enough fuel oil to keep people fairly warm while avoiding a serious health problem. From left to right, the men are: John Richards, chief of gasoline rationing branch; Wallis Sayre, assistant director of the division; Joel Dean, director of the division; John G. Neukom, chief of fuel oil branch; and Paul R. Baugh, chief of industry relations branch

tire wear daily as compared with peacetime usage, and that 68% of the cars have "A" books, 18% have "A" and "B" books, and 14% have "A" and "C" books.

Coupons To Take 6 Weeks

More than 6 weeks will be required to print the necessary forms for nationwide rationing, which will number 61,000,000 coupon books, 91,000,000 gummed sheets for preservation of coupons by service stations, 60,000,000 application forms, and about 100,000,000 copies of audit control forms, regulation books, instruction guides and other forms.

OPA is proceeding on authority contained in Mr. Jeffers' brief directive of Sept. 25 which follows:

"(1) The Office of Price Administration is hereby directed and authorized to institute nationwide gasoline rationing on the same basis as the gasoline rationing program now existing in the Eastern states.

"(2) It will be understood that after the installation of a nationwide gasoline rationing, the Office of Defense Transportation will review the program from the standpoint of its effects upon the transportation service of the nation.

"(3) The existing arrangements between the Office of Defense Transportation and the Office of Price Administration relative to rations for commercial vehicles in accordance with General Order ODT No. 21 will be continued and extended throughout the nation."

He said his job was "first—to provide the rubber for military needs; second—to provide tires to essential civilian driving and rubber for essential manufacturing needs; third—to accomplish these two requirements with as little disturbance as possible to the economic life of our citizens."

The fairest method of saving our transportation system, he added, is thorough nationwide gasoline rationing and 35 m.p.h. speed limit.

Until the program can get underway all over the country, he asked the country to voluntarily reduce driving and obey the 35 m.p.h. speed limit.

'Kills 2 Birds with 1 Stone'

"Reducing the speed limit to 35 miles per hour kills two birds with one stone," he said. "It will give you more miles for every gallon of gasoline you do have, and what is more important, it will give you at least 40% more miles on the tires you now have.

"It will make it possible for you to keep your automobile rolling when you actually need it—and that's important when you remember that until we get enough rubber for military needs and for essential civilian needs there won't be any for new tires for you."

East's 'Pool' Plan Gets 'Green Light'

(*Continued from page* 3)

and have one marketer supply all customers in a certain area. Overall gallonage position of each supplier would be maintained so far as possible. Original supplier would bill his customers even though deliveries were made by another.

Each local delivery pooling plan will have to be submitted to ODT for approval. Under ODT General Order No. 21, assuming control over all commercial vehicles, ODT apparently has power to compel a recalcitrant supplier to join a pool.

ODT plans to work through local groups of fuel oil marketers, to be named as subcommittees of its state petroleum transporter advisory committees (*see NPN Aug. 12, p. 30, for list of these ODT committees*).

Selective Service Director Tells How to Get Deferments

By Major General Lewis B. Hershey, Director of Selective Service

Manpower is a most important strategic material of today. Every employer should make a prompt inventory, appraisal and analysis of the manpower in his own plant as he would inventory his stock pile. In order to keep production going and at the same time furnish men for the armed forces, industry should now establish an orderly replacement program.

In order to secure temporary deferments for essential men while he is training women, young men, older men, men physically handicapped or those with a high degree of dependency, the employer should know the fundamental principles in the operation of his local Selective Service Board. Certain steps should now be taken by each employer. He should know how many men on his pay roll are between the ages of 20 and 45. He should investigate the classification of every one of those men. On the basis of such an inventory he should prepare to plan ahead and train men for replacement of those who must necessarily enter the armed forces if we are to have the sort of army which can win the war.

Deferments Temporary

Deferments, granted so that employers may train women or men not liable to early induction, are temporary deferments; they cannot exceed six months and in many cases may be for only thirty, sixty or ninety days. The Army today has to train a bomber pilot within a period of eight months to operate a very technical machine with an instrument board which puzzles an expert. Why, therefore, should industry insist that it assume that it can take two or three years to train men for industrial tasks not nearly so complicated?

The fundamental purpose of every deferment of a registrant is to allow an employer to train a replacement. Only in a few rare instances can an employer expect to have these temporary deferments continued for more than the six months period. These are only in cases where an abnormally long period of training is required for a replacement and the eight months needed in which a bomber pilot can be turned out now, is something to remember in this connection.

Employer's Responsibility

Employers may seek the deferment of their necessary men with or without their consent.

Here is how they go about it.

On page 3 of the Selective Service Questionnaire (Form 40) which is sent to each registrant before he is classified is the following:

INSTRUCTIONS.—If your employer believes that you are a necessary man in a necessary occupation, it is his duty to fill out form 42A requesting your deferment. You may also attach to this page any further statement by yourself which you think the local board should consider in determining your classification. Such statement will then become a part of the questionnaire.

This is on all the questionnaires distributed during the past six months. The fact that the Selective Service System now specifically mentions the filing of Form 42A as the manufacturers' duty is a clear indication of the Selective Service System view on the responsibility of each employer in this matter.

The employer can secure Form 42A at the local board and the local board will consider the employer's request when the form is properly filled out and signed.

If such request should be denied because the man, after consideration of the claims offered for him, is not considered to be indispensable to the company's operation, and is needed more in the armed services, the local board will advise the employer of its refusal of such an occupational deferment.

The local board does this by sending to the employer, at the same time it notifies the registrant of his classification, a Form 59.

May Make Appeal

There are ten days after Form 59 is mailed by the local board to the employer during which the employer can appeal the registrant's case.

The registrant will not be ordered to report for induction during this ten-day period.

In order to take an appeal the employer simply has to sign his name to Form 59 which he has received, and return it to the local board; or in case the Form 59 is not received from the local board, any written request will have full value to make such an appeal effective.

When Form 59 is returned by the employer the appeal procedure becomes automatic.

All necessary forms are available at the local board in the employer's immediate vicinity or at the office of the State Director of Selective Service.

If the local board and the appeal board deny the appeal for the occupational deferment of a key man, the employer may then bring the matter to the attention of the State Director at the State Selective Service Headquarters, with the request that the case be reopened or appealed by him to the President.

Definite Duty

A double duty rests upon the employer. He should personally know what his manpower situation is. He should not leave the job to a minor employee to decide who is necessary. The employer who delegates the task of filing a request for deferment to a clerk, the executive who does not make a complete inventory of his whole plant today, is negligent. Likewise, the employer who files requests for deferment of men who can be replaced by women, or others, is keeping reinforcements out of an Army which is battling for us all. The employer engaged in essential war production who has been required to greatly expand his plant and who then fails to request deferment for his key men is also negligent.

A good rule to follow: Don't ask deferments for any men who can be replaced by training another individual not likely to be eligible soon for service in the armed forces.

Make an inventory, request deferment for any man whose immediate going into the armed services would retard production of vital war material or other services essential to the war effort, or who is needed to maintain national health, safety and interest.

Only when an employee is working in a critical occupation within an essential industry should a Form 42A be filed for his temporary occupational deferment.

Make Replacements

Yes, an inventory within a man's own plant is called for; also an appraisal and analysis of the manpower in the community. There is many a man over 45, or a man physically handicapped, or a woman who can do that job that the 23-year-old boy is doing who took a 12-weeks course at a learn-quick school.

There are not more than sixty million people in this country who are capable of effective productive effort. These men and women represent our total manpower available to win the war. They must do everything that must be done in a total war; maintain transportation, communications and utility systems, maintain public services, grow food for ourselves and our allies, mine the metals and produce the raw materials, fabricate and produce the amount of consumers goods necessary to maintain even a restricted national life and the supplies, weapons and munitions of war; also most of all they must provide the men who land on strange shores in far places, the men who carry the fight to the enemy on a multitude of far-flung frontiers. The rest of the population who mine raw materials and produce the weapons with which these men fight must be a self-disciplined team working in unity. The individual personal convenience, comfort or pleasure, or the convenience and ordinary leisurely replacement programs of the employer, will have to be given progressively less consideration as the war gets tougher and the casualty lists grow.

When we hear of the big armies we are going to raise, we must all remember that it takes at least five men or women to produce what they eat, use, fight with, and wear. With less than sixty million availables in this country, those figures are worth deep consideration.

O'Mahoney Plans Resumption Of Hearings October 5

WASHINGTON—Senator O'Mahoney is going ahead with plans for resuming his subcommittee's investigation of petroleum reserves and production on October 5, as tentatively agreed on. The one barrier to making the date definite is the pressure that pending tax legislation puts on members of the subcommittee at that time.

There will be no formal hearings. At the meeting, senators will hold informal, roundtable talks. Two days, Senator O'Mahoney believes, will be enough to gather up the facts already developed and any new ones presented, then shape them into definite legislation. He hazarded no guess as to what form this would take.

The conferees will have before them the minutes of the field hearings held by the Senator this summer at Casper, Wyo., Artesia, N. Mex., and Midland, Tex. No definite acceptances have been received, but the Senator hopes to have at the meeting top men of the armed services, the heads of OPC, OPA and ODT, as well as spokesmen of the oil industry.

How Stations Can Become Official Tire Inspectors

WASHINGTON—OPA may need as many as 100,000 service stations, garages, tire and automobile dealers to inspect passenger car and truck tires under compulsory 60-day tire inspections.

The consolidated nationwide gasoline and tire rationing program, to become effective about Nov. 22, requires that all passenger car tires be submitted to OPA every 60 days for on-wheel tire inspections.

ODT's big truck control order, effective Nov. 15, requires that truck tires be inspected every 60 days or every 5000 miles whichever is sooner.

OPA has been using a force of tire inspectors ever since it started rationing tires last January. Numbering about 35,000 now, the tire inspectors must examine the tires of persons eligible to apply for tires under present ration plan. The inspectors certify on the application blank whether the tire needs recapping or whether it needs to be replaced.

Instructions to inspectors have been spelled out by OPA through information issued to local ration boards. They are told when a tire can be repaired and when it cannot by defining the extent to which a tire can be injured and still be repaired.

Prepares Instructions

Instructions are being prepared for the new batch of inspectors, which will be issued to local boards soon. The exact number of inspectors that will be needed is not known yet, but is estimated at about 100,000.

To be named a tire inspector, a service station operator needs only to apply to his local board. Officials said there is nothing formal about the application. Not even a formal application blank must be filled out.

The board takes the name, address and experience of the applicant, checks up on him to see if he is satisfactory, and if the board is satisfied with the man, he is appointed. A record is kept by local board of each inspector to make sure he is faithfully performing his job.

Inspectors are called in frequently for instructions, and can be removed from duty at any time. Local boards are free to appoint as many inspectors as they need.

If a service station operator or other tire man wants to be a tire inspector but is turned down by his local board, he can appeal the decision to the state director, to the regional director and even to Washington.

Because of the heavy demand that will result for inspectors, OPA is considering the appointment of about 200 field inspectors who have had experience in the tire business and know how to handle men. They will work with the local boards in picking and training the local tire inspectors.

Qualifications Listed

The qualifications for a tire inspector are that he be of good reputation in his community and experienced in handling and maintenance of tires. The fact that a man has merely sold tires is not sufficient, officials said.

The inspector's job under OPA's "mileage rationing" plan is to see whether tires need repairing. If they do, the drivers application will not be approved by the inspector.

A charge may not be made for on-wheel inspection, but if the tire must be removed and mounted again for inspection a maximum of 50c may be charged. The ceiling is set in OPA's revised tire rationing regulations. The inspector does not necessarily have to make the repairs found necessary. A motorist may have his tire inspected at one shop and repaired at another.

A tire inspector's tools must include the equipment necessary for demounting and mounting a tire, a jack, necessary tube testing equipment and an air compressor.

OPA officials said competition between tire inspectors would keep down any "high jinks" on the part of inspectors who might try to charge excessively for tire inspection and repairs before giving a motorist an "okay" on his tires.

1-Year Suspension Ordered On 'Gas' Ration Charge

WASHINGTON — A one-year suspension of gasoline sales has been ordered for a Gardner, Mass., gasoline dealer for alleged misrepresentation under rationing regulations, according to OPA.

OPA charged that the dealer registered with his local board on July 22, claiming that he had only 750 gal. on hand. OPA contends that he actually had 7850 gal. in his tank at the time he registered and he thereby obtained inventory coupons for 7100 gal. to which he was not entitled.

OPA Plan to Cut One-Third From Fuel Oil Consumption

(*Continued from p.* 3)

house is normal as defined by the OPA heat loss formula range, the cut will be one third of consumption in a normal winter. If the house is more efficient than standard, the cut will be smaller and may be as low as 15% from normal consumption. If the house is wasteful and an inefficient user of fuel oil, the cut will be greater than 33 1/3% from normal. The exact amount depending upon the thermal efficiency of the house."

The 30-state area has been divided into thermal zones according to climate (*see map on page* 9). The heating season has been divided into 5 periods with approximately same number of degree days in each. Length of these periods varies with the thermal zone. Different-colored coupons will be issued for each zone.

Starts October 1

Rationing starts Oct. 1, although coupons won't be ready for some time after that date. After Oct. 1, fuel oil cannot be purchased except when the purchaser signs a "promissory note" to give his supplier the required number of coupons when available. Flow-back system on coupons will be followed, similar to that used in gasoline rationing (*see story elsewhere in this issue*).

OPA intends that every domestic consumer start Oct. 1 with a full tank. When the consumer applies for his ration book, coupons for 250 gal. will be torn out of the book.

However, many suppliers believe that it will be impossible to fill all consumer tanks by the Oct. 1 deadline. In that case, OPA has indicated, consumers will still have the coupons torn from their book but they can apply for a supplemental ration covering fact that they didn't start with a full 250 gal. in their tanks.

Dealers Swamped

Publicity given by OPA to this Oct. 1 deadline has swamped dealers with orders. Their telephones have been ringing constantly as deadline nears and oil hasn't been delivered to some homes. Some dealers just could not make all deliveries in the period between Sept. 15 and Oct. 1.

Fuel rations for each home will be on the basis of (1) past consumption and (2) thermal efficiency of the individual house. Supplemental rations will be allowed for homes with aged persons, illness or small children. A special allotment will also be made for hot-water heating.

Using a formula and scale developed by OPA, local rationing boards will take the square-foot measurements of the house and determine the basic ration. Supplemental rations, if any, will be added and the ration book "tailored" to fit this amount. Enough coupons will be torn out so that those remaining will be exact amount of total ration.

At start, coupons will have a value of 10 gal. each but are subject to change. Besides supplemental rations, OPA plans other safeguards against sudden cold snaps or a long period of extreme cold. These include emergency coupons which can be given a value on short notice. Also, there will be a "slop-over" period during which coupons can be carried over into the next period or coupons for next period can be used in advance.

Conversion Drive Gets New Impetus

WASHINGTON — Efforts to secure oil to coal conversions are gaining momentum with extension of the plan to western sections of the country, accompanied by publicity measures designed to teach the public how homes can be kept warm with less fuel.

The national fuel oil conversion campaign is aimed at saving 100,000,000 bbls. of fuel oil annually. The goal on the East Coast is a saving of 40,000,000 bbls. by industrial users and 5,000,000 by domestic users. To date, the industrial saving is approximately 25,000,000 bbls. a year.

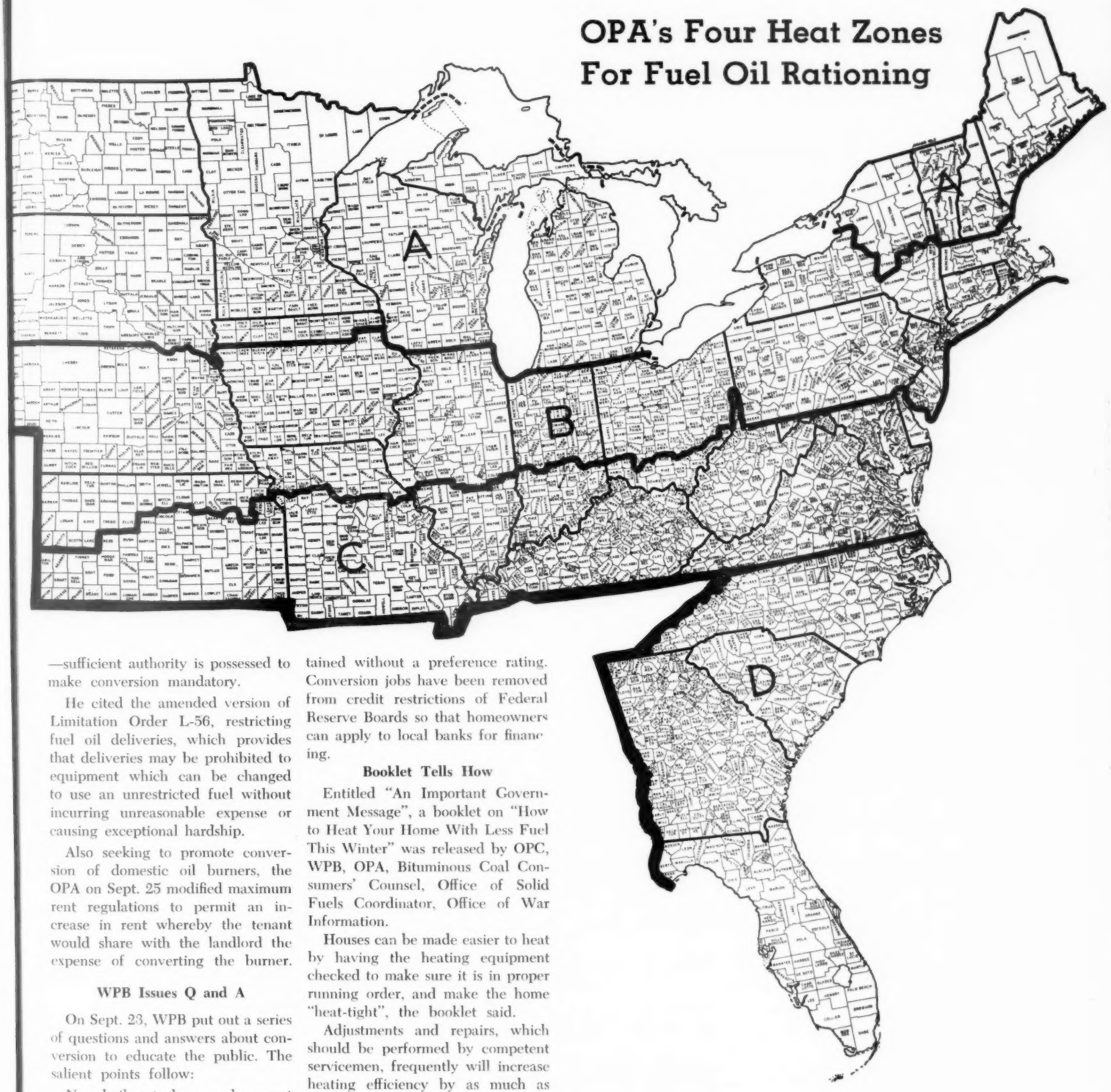
In District 2, a 22,500,000-bbl. saving has been set as the goal.

Goals for Districts 1 and 2 total 67,500,000 bbls.

That leaves 32,500,000 bbls. to be saved annually in Districts 3, 4 and 5.

Deputy Coordinator Davies made it clear that—while the government will encourage voluntary conversion

OPA's Four Heat Zones For Fuel Oil Rationing



—sufficient authority is possessed to make conversion mandatory.

He cited the amended version of Limitation Order L-56, restricting fuel oil deliveries, which provides that deliveries may be prohibited to equipment which can be changed to use an unrestricted fuel without incurring unreasonable expense or causing exceptional hardship.

Also seeking to promote conversion of domestic oil burners, the OPA on Sept. 25 modified maximum rent regulations to permit an increase in rent whereby the tenant would share with the landlord the expense of converting the burner.

WPB Issues Q and A

On Sept. 23, WPB put out a series of questions and answers about conversion to educate the public. The salient points follow:

New boilers to burn coal can not be obtained on less than an A-10 priority rating. New oil burners cannot be purchased to replace an old and inefficient one. A person with two burners—oil and coal—who uses the oil burner regularly and the coal burner only during severe weather should reverse his practice. Grates, stoker bars, fire doors, etc., can be bought and sold without a priority rating. Persons who have been told coal will not be available if they convert should consult local coal dealers. Oil burners cannot be converted to gas. An extra section for a boiler cannot be obtained without a preference rating. Conversion jobs have been removed from credit restrictions of Federal Reserve Boards so that homeowners can apply to local banks for financing.

Booklet Tells How

Entitled "An Important Government Message", a booklet on "How to Heat Your Home With Less Fuel This Winter" was released by OPC, WPB, OPA, Bituminous Coal Consumers' Counsel, Office of Solid Fuels Coordinator, Office of War Information.

Houses can be made easier to heat by having the heating equipment checked to make sure it is in proper running order, and make the home "heat-tight", the booklet said.

Adjustments and repairs, which should be performed by competent servicemen, frequently will increase heating efficiency by as much as 40%, the booklet added.

Suggestions on Oil Burners

For oil and gas burners, the pamphlet suggested:

"Clean the flue passages; with oil burners this should be done at least once, and possibly three or four times a year. Make a complete combustion checkup. You may be losing too much costly heat up the chimney. See that the draft regulator is properly adjusted. Seal all air leaks."

The booklet also discussed insulation, storm windows and doors, and weather stripping.

Office of Price Administration has set up 4 heat zones in the fuel oil rationed areas. These zones are based on severity of cold weather, so that Zone A will get more fuel oil allowance than Zone B and so on down the line. The county map reproduced here shows the areas included in each zone.

In addition, OPA has divided the year into 5 heating periods of equal number of degree days each, varying according to heat zones (A, B, C, D) as follows:

Zone A—Period 1, Oct. 1 to Nov. 29; Period 2, Jan. 6; Period 3, Feb. 8; Period 4, Mar. 17; Period 5, Sept. 30.

Zone B—Period 1, Oct. 1 to Dec. 2; Period 2, Jan. 5; Period 3, Feb. 6; Period 4, Mar. 12; Period 5, Sept. 30.

Zone C—Period 1, Oct. 1 to Dec. 3; Period 2, Jan. 4; Period 3, Feb. 2; Period 4, Mar. 6; Period 5, Sept. 30.

Zone D—Period 1, Oct. 1 to Dec. 5; Period 2, Jan. 2; Period 3, Feb. 5; Period 4, Mar. 6; Period 5, Sept. 30.

Washington Personalities

J. Howard Marshall . . . OPC's Chief Counsel

When J. Howard Marshall, OPC's chief counsel, started pounding law books, the newspaper profession lost a man whose talents as a managing editor in this war would be the envy of competitors in similar positions on rival publications.

For, at 37 years of age, he might well have been a managing editor—if he had stuck to newspaper work. And in such a position his drive to get things done, to get them done right in the first place and to do them under pressure, combined with his knowledge of hundreds of out-of-the-way places where this global war is being fought, would have rated him tops in newspaperdom.

In managing an editorial staff, he could have cracked a whip with the best of traditions in this romantic profession. Moreover, occasions might have arisen when he'd have been willing to throw in a few sulfurous words. It's even fair to say that with "Managing Editor" Marshall around, such occasions might have become office routine. But to do him justice, he does not follow such tactics at OPC as closely as might be implied from these statements.

Could be 'Terror of a City Room'

It's not hard to imagine Howard—as the OPC staff knows him—either with cigarette in hand or reaching for a pack, come stamping and shouting out of a glassed-in office in some metropolitan newspaper's city room, demanding to know why some assignment which he'd given just that morning wasn't completed the day before. As such, he'd have been a delight to his publisher, but a terror to his staff—which would have liked it nonetheless and admired his talents.

Howard is no longer a newspaperman, however, but he does have a legal staff, quite a sizeable staff in fact, and the combined opinion of his men is that "Howard knows what it's all about".

Has the Vocal Cords of an Editor

Howard's method resembles the managing editor's approach, for when handing out an assignment to a staff member, he's been known to raise his voice somewhat above ordinary conversational tones.

Most people will agree that Howard was either born with or early acquired the "know how" of getting things done—right now, he's getting them done for the United Nations' petroleum industry. OPC's activities are no longer confined to the U. S.

While attending Haverford College, from 1922-26, OPC's Chief Counsel Marshall worked during summer vacations on the copy desk of the Philadelphia Inquirer, as well as being editor of the college daily. Previous to that, he had edited a paper at a Quaker boarding school, the George School, near Philadelphia.

Mr. Marshall was born Jan. 24, 1905, in Germantown, Pa.

Captained Tennis Team at College

In college, he was captain of the tennis team, head of the college press bureau, all-American intercollegiate soccer player for two years, president of the student council and captain of the debating team. He engaged in almost identical activities when at the George School.

During his first year out of college, Mr. Marshall spent 11 months on a "floating University" carrying students around the world, combining pleasure with studies. On board, he edited a daily newspaper and taught English, economics and history, earning enough money to carry him through his first year in Yale University's School of Law. The end of his first year of law found him broke, so he shipped aboard another "floating university", this time working as general business manager.

With enough money then to put him through, Mr. Marshall was graduated with a LL.B in 1931. While at Yale, he was case editor of the Yale Law Journal and did some work for Rushmore, Bisbee & Stern, a New York law office.

Following graduation, he was named assistant dean and instructor in the Yale Law School, the next year being made a professor.

One of the 'Yale Twins' in NRA Days

Shortly after this, Mr. Marshall and Norman Meyers, (the "Yale Twins" during oil code days) batted around the Mid-Continent oil fields,

Give the toughest legal snarl to J. Howard Marshall and within a short while he will find a way out

crystallizing their knowledge in a series of articles on "Legal Planning of Petroleum Production". Interior Secretary Ickes read these articles, and in the summer of 1933—when NRA's blue eagle was being hatched—called Mr. Marshall to Washington as assistant solicitor for the Interior Department. The oil code days followed, and Mr. Marshall went to East Texas "to struggle with 'hot' oil.

When the Supreme Court knocked out NRA's Section 9-C, in the famous Panama-Amazon case, Mr. Marshall drafted new "hot" oil legislation—the Connally Law.

Mr. Marshall was a member of the Petroleum Administrative Board, as well as legal counsel. From 1933 to 1935, he was special assistant to the Attorney General, and during this time, he tried such famous oil cases as Panama, Papoose and Wilshire.

Chief Marshall also represented Mr. Ickes on the California Petroleum Central Proration Committee.

California Calls Him Back to Law

Following his government work in 1935, Mr. Marshall joined California Standard as a special counsel, and in 1937 transferred to the San Francisco law firm of Pillsbury, Madison and Sutro, whose practice included representing California Standard. In 1939 he became a partner in the law firm.

When OPC was organized in June, 1941, this versatile oil-lawyer became chief counsel, a position he's held ever since.

Many of the strange names which crop up in the war news these days are "old stuff" to OPC's chief counsel. He's been there but finds it interesting "to wonder what in the devil is happening" to this and that landmark.

Mr. Marshall is married and has two sons, one 6, the other 3.

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and publisher, Penton Building, Cleveland, O.

"Small Competitors" in Oil Marketing Imperiled by Rationing and War Hazards

WHAT is the oil industry, and particularly the major companies, going to do to maintain competition in oil marketing?

That is a basic question that naturally follows last week's announcement of national gasoline rationing which, it is estimated, will cut passenger car consumption at least 44% on the average and even up to 60%.

That question also naturally follows the inauguration of plans in the East Coast area for consolidating transportation and marketing facilities and making the products of all companies universally available to each company, in the laudable effort to stretch limited transportation facilities to the maximum to keep East Coast inhabitants from freezing and having to walk.

What is the oil industry going to do for competition is also a question prompted by OPA refusals to advance petroleum prices for increased marketing costs, as well as declarations of its economic philosophy that only the "socially desirable" among oil companies should survive the hazards of both the war and the administration's practice of its own brand of economics.

Last week's gasoline rationing order ends any period of philosophic discussion of this principle of economics and puts the question squarely up to the major oil companies who, by the Washington administration's plan, will be the only marketing units that some government people will seek to keep in existence.

To reduce gasoline consumption from a level providing an average of 9000 miles a year per car, as taken by the Baruch committee's report as a fair pre-war average, to a level providing only an average of 5000 miles per car as suggested by the report, is a cut of 44%—a cut that will apply nationwide to all retail marketing of gasoline.

While most any company can adjust its expenses and overhead to considerable reductions in volume of business, any such large cuts promise many fatalities unless ways are found to cushion the shock.

OPA frankly assures the small oil companies without, so far as we have seen, giving one single expression of regret, that the fatalities will be very great.

On the other hand, Deputy Petroleum Coordinator Davies just last week told the industry that while undoubtedly the economic casualties would be severe, nevertheless it was the aim of his office "to hold this casualty list to a minimum consistent with the controlling necessities of the war program." He also assured the industry that there would be fair play and that "no one should be required to suffer loss to the profit of another". He said he looked to the industry to work out "profit sharing and loss sharing plans" and "compensatory arrangements" so that the industry would emerge from the war "without the sacrifice of its independence". (*See pages* 13-15 *NPN Sept.* 23).

Large Oil Companies Vulnerable, if Alone

PRESERVING competition is essentially a necessity to those whose very life and freedom of ownership and action depends on good, strong, healthy competition.

Those direct beneficiaries of competition are the major oil companies. If real marketing competition with them disappears in any considerable degree by reason of the war, and the majors grow larger and stronger and sell only through their own facilities, one is well justified in holding the opinion that government—especially this present national administration and its immediate heirs—will undoubtedly dominate the operations of these large oil companies to the exclusion of the stockholders and their duly elected officers. That this has been the long-time ambition of some has been evident from the continued attacks and maneuvers in Congress and in courts for the past ten years.

Many ticklish questions will be met by major oil companies in this war's difficulties, but probably there will be none more perplexing than those involved in "unitizing" and "consolidating" marketing activities and marketing properties, at the request of the government. If such "unitizing" eliminates the smaller competitor and his properties, the end of the war will find the majors without such independent marketing competition, now represented by more than 6000 fair sized to large oil jobbers. That will make the majors wide open to attack politically and in law, according to the reformers' interpretations of the anti-trust law.

Most major oil companies do a very considerable portion of their business through jobbers; in fact, jobbers distribute through service stations 42% of the gasoline thus distributed at retail. In these jobbers, these majors have adopted the policy of decentralized management and of home ownership. These majors have spent millions and much expert study to develop and strengthen the many thousands of jobbers who sell their brands. These jobbers' sales have been steadily increasing.

As the "consolidating" of marketing facilities increases under government direction the majors will, in some places, have to decide whether to use their own company owned and operated bulk plant or their jobber's. Or one major will want to have the group "unitize" on his company owned plant while across the table is a major who wants to have the group "unitize" on his jobber.

Complicating the picture undoubtedly may be even unfair claims by either the opposing majors or other majors or jobbers.

Or in the battle for declining gallonage the question may be who to let close that his gallonage may go to the others to keep them alive?

But regardless of how vexing these problems, the fact remains that the major oil companies will have to decide, at least in many cases, what in the long run is better for them to have in business against them and around them—Independent jobbers and Independent competitors, "small business men", or just establishments owned by other large major oil companies?

How Sound Competition Can Be Saved in Industry

POSSIBLE solution to this realigning of oil marketing for the war effort lies in several directions—in sound economic statesmanship, in the inculcation of good marketing aids and practices, by the addition of more profitable services and, if possible, even additional merchandise, and through obtaining a fair price ceiling, a ceiling that will keep oil marketing healthy and not inflict totalitarian reform.

Marketing statesmanship lies in building the present to insure a sound future, in giving competitors the benefit of many doubts, yes even in closing down major company establishments in favor of efficient competitors who will serve the customers

properly and assure the generous major its share of the gallonage in refinery sales. Majors will have to be fair to each other when this may be done. Any inter-major company sharpshooting will send the suffering and dying competitors to Congress which certainly will deal harshly with the majors and their sharpshooters.

Major oil companies will also lose some bulk plant and much station and dealer business from gasoline rationing, like their smaller competitors. But the majors' refineries will be busier than ever supplying the country's war needs with petroleum products and with the new petro-chemical products for which the major oil companies are now spending nearly a billion and a half of government dollars on new and additional plants. No matter how bad retail marketing gets, major oil companies will have an increasing refinery volume of sales, if not this year then next when this country really puts its fighting in the air, as it will and must to win the war. But its smaller marketing competitors have no place to turn for sales to replace their shrinking volume.

Major oil companies over recent years have done an excellent job in making available to jobbers merchandising aids, advertising helps, and national brands and management instructions as to the best way to make these modern business tools pay good profits. Good sales and management aids can be sharpened still more and offered to more jobbers.

Major companies can do a better job than they have done in insuring, through P.I.W.C. and OPC that their competitors are given full opportunity to supply the truck and car owners with the tire inspection, tire repairing and truck and auto maintenance services required by recent war agency orders. These, if properly developed, can bring in much needed additional revenue for the Independent jobber.

Perhaps more merchandise than has heretofore been sold at stations can be found that will keep alive some bulk plant and station sales. If there be any such merchandise, major company sales experts are the men who can best find it.

P.I.W.C. Should Attack This War Problem

THEN major oil companies, and P.I.W.C. and OPC, should help their marketing competitors to so organize that they can either present such a story to OPA as to get prompt and sufficient and continuing relief from low price ceilings, or that these competitors can go to Congress and cause it to relieve OPA or any other government agency of the power of fixing unfair prices, prices that reform rather than protect the country from inflation and prices that destroy that very competition some government officials like to talk so much about and do so much against.

There is another and even more pressing reason why the major oil companies and P.I.W.C. and OPC should make a real fight for freedom from the heavy hand of OPA or other war agencies on prices, and that reason is that one of these days the country and the oil industry will wake up—too late—to the fact that OPA's short-sighted oil price policies have so restricted the supply of petroleum products as to hamper and even to block the country's war effort. Such a tragedy is entirely possible from OPA's present price policies.

The first step in all this would seem to be the determination and declaration by the majors, say through P.I.W.C., of a policy of doing everything possible, consistent with the war effort, to maintain marketing competitors.

The second step would seem to be the creation of such machinery as to carry out that policy—machinery augmented by better representation of small marketing competitors on P.I.W.C. and on the advisory committees of OPC. These are improvements that are now under study by Deputy Petroleum Coordinator Davies assisted by Special Assistant Coordinator Frey who, in furtherance of such improvements, is now holding meetings with officers of the state oil jobber associations.

The oil industry, we know, is going to make every sacrifice necessary to win the war, regardless of impeding efforts of some Washington interests; but, we are also sure, every oil man is bitterly opposed to seeing his or any other oil man's business unnecessarily sacrificed on the altar of totalitarianism.

To have a free oil industry it is absolutely necessary to have strong and universal competition within the industry.

Here is the opportunity for the industry's leaders today.

Get Your Stations Licensed To Do More Tire Business

POSSIBLE additional dollars for oil marketing may come from the Baruch rubber report, the recent truck registration and tire inspection order of ODT and last week's similar order of OPA at the direction of the new Rubber Director.

These dollars are possible if oil marketers can get themselves named to do the tire inspecting every 5000 miles or every 60 days and make the necessary repairs and do the recapping required to keep those tires in good condition.

Up to these orders, tire inspecting has consisted of certifying to a rationing board when a man needs a new tire or a recap. For such inspecting the official price was 50c. This did not interest many oil stations, according to reports, because there were relatively small sales as a result.

But the orders for inspecting tires to conserve rubber say that an owner cannot use his tires until they are inspected and put in good shape, all of which should mean considerable sales of repair and recapping servicing, a volume of possible business of real interest to every oil marketer equipped to render the service.

State oil jobber associations and committees of OPC should be at work now to see that all properly equipped oil companies can have this work if they want it. At the moment the selection of these official inspecting stations seems to rest with OPA, though ODT and presumably the Rubber Director could tell OPA who to name.

Oil Companies Can Do Good Supervising Job

OIL marketing men have particularly good arguments as to why properly fitted oil company stations, either directly operated or leased or operated by their dealers, should be among the licensed stations;

1—Probably nearly all the stations and tire dealers who are equipped to do the inspecting, the repairing and the servicing of wheels and tires, are oil company owned, or oil company equipped or are particular oil and gasoline customers; and

2—Oil marketing companies, jobbers and majors, have the necessary management and sales supervising forces to teach the station operators how to do a good inspecting and repair job and to see that they continue to do the right kind of a job.

"Inspecting" tires under this ODT order and under the order from the Rubber Director of WPB, will be quite different from "inspecting" a tire when one has plenty of tires to sell the car owner. In the "old days" such "inspecting" amounted simply to selling the car owner a new tire by pointing out to him how useless it was to try and patch the old tire and perhaps sweeten the deal with a little "trade-in allowance".

But under the new orders a tire inspector has behind him the authority of government to force the truck and car owners to spend money with the tire dealer practically in the amount for what that tire dealer says they should spend. There undoubtedly will be standard prices set by OPA but in the last analysis the tire inspector will be telling the car owner how many of those services the car owner must buy in order to be allowed to go out on the highway again and run his car, even to go home with it.

There will be car and truck owners who will not want to accept the inspector's judgment and they may be good gasoline customers. Even though they may not protest, there probably will be a doubt in other car owners' minds as to the necessity for doing part or all—today—of what the inspector recommends.

This relationship between customer and service station at best will be a ticklish one. It is one that calls for the best of supervising management from the oil company owning, or leasing or supplying the station. If the relationship is a poor one the oil com-

that can wasn't "planted"!

PHOTO BY U. S. ARMY SIGNAL CORPS

No specially posed advertising illustration is this picture!

It's an official Army photograph . . . straight from the files of the United States Army Signal Corps (SC-130812 to be precise) . . . and that Crown Can is there because it's actually in service!

When Crown wanted a picture to show a water purification unit of the U. S. Engineers in actual operation the Signal Corps supplied this picture. We did not tell the Army for which of our customers we wanted to use the photograph. It was our original intention only to use the picture as a background . . . and say that Sanitation HTH, the product of our customer, the Mathiesen Alkali Works, Inc., of New York, was used by the Army in many of these units.

But when we got the print, there was a Crown Can holding Sanitation HTH, sitting on a rock with the trademark perfectly legible!

Just goes to show that you'll meet up with Crown Cans in lots of places the Army and Navy go in wartime!

CROWN CAN COMPANY, PHILADELPHIA, PA., *Division of Crown Cork and Seal Company*

CROWN CAN ★ ★ ★ ★ ★

pany, in the end, will be the sufferer, for its brand of products and its stations stand to be boycotted by the dissatisfied car or truck owner. In fact, in times of increasing gallonage an oil company might prefer not to have its stations make such official inspections.

This relationship also calls for good supervising management because, despite the authority to keep a car or truck off the road, proper tire maintenance must still be "sold" to the owner of the vehicle. He may be anxious to save his tires but perhaps not at the price stipulated, at least perhaps not that day.

"Gyp" Inspectors Can Wreck the Plan

THE government will have to be much interested in seeing that this inspecting relationship is not abused by tactless tire dealers or by gyps. If report gets around that "inspecting" tires has become a racket, the police are not going to spend much time arresting cautious car owners and friendly station operators may supply an official "O.K." without looking. With prohibition still recently in the minds of most of us, it would be easy enough for the general public to "walk out" on a law that it thought unfair, no matter how many regulations the government issued. Therefore, the government would be interested in seeing that all licensed dealers were carefully selected, were well trained and properly supervised and managed as would be the case with oil company outlets.

But in addition to these reasons would be the very good one that properly checking and repairing tires under government control of use, in order to be worthwhile and fair, calls for skill and mechanical ability, as well as personal honesty. Good tire men are harder and harder to get and the harder they are to get the more they need training and constant supervision. Also the tire owner is going to be more exacting that a good job is done, otherwise he will be back and a well worn tire, it will be found, is not the easiest thing in the world to keep in good shape.

The more "independent" a tire dealer is, that is the further away he is from capable and responsible supervision and guidance, the more of a liability he is likely to be to the whole cause of tire inspection under federal control of tire use, and the greater liability the dealer will be to himself.

The oil marketer, with his even daily supervision of a service station, is in the best position to help the dealer, to keep him and his tire men coached as to proper maintenance work, and to help him with the difficult selling that tire inspection will call for.

But in addition to this constant supervising aid, the oil marketer lends his good name and reputation for fair dealing to the tire dealer, through the gasoline brand that he distributes.

A good oil marketing company also is in the best position to do the most effective selling in that all dealers could be used as sales agents; that is give first inspection and then refer the tire owner to a central or main station where a re-check would be made and the repair and servicing work would be done. A good volume of work at such a central station would insure the keeping of good tire men and being able to pay them good wages, and also pay for first class and minute supervision of all work, which will prove to be absolutely necessary to insure customer satisfaction.

But above all, so far as oil marketers are concerned, they need the business. However, if they want to be sure of getting it under reasonable regulations, the marketers had better hurry up their associations and OPC committees to contact OPA and ODT.

REPRINTS OF BARUCH REPORT

Do you want a better and clearer conception of the vitally important rubber shortage? If so you will want to read the actual word-for-word text of the famed Baruch Rubber Report.

NPN has a limited quantity of reprints (from the issue of Sept. 16) which give you the Baruch Report verbatim. Only 15c each. Write for quantity prices.

Send cash with order to NATIONAL PETROLEUM NEWS, 1213 West Third Street, Cleveland, Ohio.

150,000,000 Miles of Joyriding!

'Gas' Ration Book Thefts Up; Total Now More Than 50,000

WASHINGTON—More than 50,000 gasoline ration books — the equivalent of at least 10,000,000 gal. of motor fuel—have been stolen recently from OPA rationing boards in the East.

From newspaper clippings of the past few weeks, NPN collected a list of reported ration book thefts and took it down to OPA headquarters here for checking. An OPA official confirmed each of the reports of thefts, totaling in all 50,400 books of various kinds. He indicated that there had been other thefts, too, but did not give out any details.

Using OPA's mileage figures—15 miles to a gal.—coupons in the stolen books were good for 150,000,000 miles of "unauthorized" driving. The fuel would fill 1250 tank cars or nearly four tankers.

The "hot spots" are Massachusetts, Connecticut, Rhode Island, eastern Pennsylvania, and New Jersey. Some of the thefts indicated laxity of office methods and safety precautions on the part of the boards. Large hauls were made by boys. And books are reported to have sold as low as 50c and as high as $50.

Thefts from individuals and filling stations are not included.

Of the estimated 41,000 books of all kinds stolen from all sources in New England, 32,000 were taken from local price and rationing boards in Connecticut alone—the equivalent of about 35,000,000 miles of driving.

The recent haul at the Norwich board's office—21,000 books out of its total supply of 23,000—is the biggest to date.

Rob Unlocked Cabinet

An unlocked cabinet in the OPA board office at Bridgeport, Conn., the night of Aug. 16 yielded 8000 books, according to reports. State OPA headquarters at Hartford on Aug. 24 discovered the loss of 500, with the date of the theft undetermined. Orders went out to keep books in a safe or turn surpluses over to police headquarters.

At Hamden, Conn., 1320 books were stolen from the OPA board's office Sept. 4, and 600 at Stamford late in July, with an undisclosed number taken on Sept. 18.

New England Is 'Hot Spot'

Other thefts in the New England "hot spot" included:

A South Boston office visited twice, once for 500 "A" books and again for 500 "C" books. At the Woonsocket, R. I., office two youths forced a lock on a cupboard and took 123 B's, 45 R's for large users, three S-2's and four S-1's.

At Taunton, Mass., thieves forced a cabinet and took 402 of A, B, C, D, E, R, S-1 and S-2 series—representing about 45 tank cars of gasoline.

At Norristown, Pa., two boys climbed through an unlocked schoolhouse window and made off with 2500 books, of which 1400 have been recovered. Fifty arrests were made of persons implicated in sales of the books.

Two board offices at Washington, D. C., were robbed for a total of 4450 books, of which some 3000 have been recovered here and in Baltimore. Hiding in the basement of a schoolhouse until everyone had gone, the thief went to the board's office and took 3000 books. All but 200 of these were recovered. The other theft of 1450 occurred from an office in a library.

At Hillsdale, N. J., the rationing board's office in a public school was rifled of 2450 books the night of Sept. 22. Coupon value was 692,800 gal. of gasoline. The thieves climbed an 8-ft. wire fence and broke open a steel cabinet.

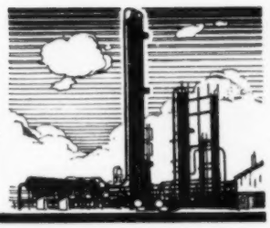
With the aid of a ladder, thieves broke into the offices of the Passaic, N. J., board in the Old District Court Building and took "about 3000" books. An audit of a board office in Philadelphia recently revealed 4500 books missing.

More Careful in South

The only other important theft below the Mason and Dixon Line occurred at Raeford, N. C., where the board's office in the county building was visited by way of a broken window and all but two books of Hoke County's entire supply—some 600—were stolen. They included A, B, C, S-1 and S-2 series.

All gasoline ration books, OPA officials point out, are the property of the federal government. When issued, they are merely lent to drivers, and there is a stiff penalty—up to $10,000 fine and 10 years in prison—for illegal possession.

News of **REFINERY MANAGEMENT** *and* **PETROLEUM CHEMICAL TECHNOLOGY**



Yield Change Reimbursement By RFC Seems Less Probable

NPN News Bureau

WASHINGTON — Proposals to have the RFC reimburse refiners generally for reduced gasoline yields have bogged down.

Refiners have been expecting favorable action. They feel that justification for the government assuming this burden was obvious.

Residual fuel oils bring about only one-third the price of gasoline, distillate fuels about half as much as gasoline.

So, changing yields to make more fuel oil and less gasoline—the "money crop" as it is called—may be enough to throw some refiners into the red, under present OPA "ceilings" on petroleum product prices.

RFC Reported Willing

RFC Chairman Jones is reported willing to take care of this war-added burden on refiners but he would want OPA to recommend such action. And OPA is apparently unwilling, at present.

One version of the stalemate is that OPA doesn't want to deal with the problem generally until there has been an overall reduction in gasoline yields to desired levels. And many refiners cannot afford to change their yields until they see the color of the government's money.

OPC has called upon refiners in Districts 1, 2 and 3 to make more fuel oil, less gasoline. But OPC can only recommend; it hasn't the power to order such action. Nor can OPC guarantee refiners that, upon compliance with its request, they will be compensated for losses involved, and OPC doesn't seem disposed to abdicate its remaining jurisdiction over the oil industry by asking WPB to issue such an order, compelling reduced yields regardless of compensation.

OPA's Position Stated

Officially, no statement has come from OPA on its attitude. However, those who have talked with OPA recently have gained the impression that the price control agency does not now intend to do anything about the matter, generally.

OPA, however, has indicated a willingness to consider applications for relief from individual refiners on a "proof of hardship" basis. Refiners who hold no war contracts might find OPA in a receptive mood on this matter, according to opinion of some observers.

Other Views Presented

OPA has asked for much data on refinery costs, which some refiners are reluctant to work up. They feel that refining costs vary too greatly with individual plants and methods of cost accounting. Also, they feel that the effort would be wasted.

Moreover, some fear that any cost figures they filed with OPA on changed yields might crop up in some other matter where such figures would be "lifted out of context", as it were.

Another suggestion is that OPA has been "stalling" until gasoline rationing goes into effect nationally, to see what effect this will have on gasoline yields.

Urges RFC Action

Meanwhile, gasoline yields in District 1 and 2, at least, are running higher than was contemplated in the Minckler plan, according to Clyde G. Morrill, Boston, secretary of Atlantic Coast Oil Conference, who has telegraphed Washington authorities urging RFC action to reimburse refiners for increased fuel oil yields.

Mr. Morrill told NPN that he was prompted to do this by latest reports on overall average yields for eastern and mid-western refiners.

Latest gasoline yield figures show an average of 40% for District 1 and 44% for District 2, as compared with recommended yields of 36% for District 1 and 40% for District 2 under the Minckler plan, he said.

Morrill Telegram Quoted

Following is complete text of Mr. Morrill's telegram which he said he sent Sept. 23 to WPB Chairman Nelson, OPA Administrator Henderson and Coordinator Ickes:

"Delivery of rationed requirements of heating oil into District 1 is predicated upon changing refinery runs of East Coast, Mid-West and Gulf refineries to yield highest possible percentage of fuel oil and lowest possible percentage of gasoline. This means losses to refiners so large that they cannot absorb increased costs when these fuel oil runs are developed to the point necessary to yield fuel oil the East Coast must have. RFC has made no arrangement to finance such losses and should do so without further delay. The eastern supply problem is not readily solved without due recognition of the fact that transportation is only one part of the picture. There must be fuel oil available for transportation. The very lives of families in the Eastern Seaboard area are at stake. What will you do to bring quick action on part of RFC?"

Mr. Morrill told NPN by long-distance telephone from Boston on Sept. 26 that, up until then, he had not received a reply from any of three officials to whom the telegram was addressed.

Herndon Directs 'Naturals' For OPC in Mid-West

NPN News Bureau

WASHINGTON—Seth W. Herndon, Tulsa, independent oil man, has been appointed OPC director of natural gas and natural gasoline for District 2.

He will have charge of all natural gas and natural gasoline work for OPC in Michigan, Tennessee, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas and Oklahoma.

Mr. Herndon takes leave of absence as president of the Herndon Drilling Co. His office will be OPC District Office, Suite 1336, 120 South La Salle St., Chicago.

Educated at the University of Missouri, he worked as a driller and tool dresser, becoming general superintendent of the Bu-Vi-Bar Petroleum Corp., which he left in 1925 to form his own organization.

Bureau Forecasts October 'Gas' Demand Off 17%, But Stocks Will Also Decline

NPN News Bureau

WASHINGTON—Despite forecast of a 17% decrease in total gasoline demand in October, Bureau of Mines expects a 1,200,000-bbl. drop in finished gasoline stocks. Last year, gasoline stocks increased 1,937,000 bbls. in October. But then the gasoline yield was 44.21% as compared with 38.30% predicted for this October.

Total demand for motor fuel in October was estimated at 50,700,000 bbls. as compared with 60,927,000 bbls. last October. This continues the sharp decline in demand which set in last July.

Bureau of Mines had forecast a decline of 17.4% in motor fuel demand for the July-September quarter. July demand was much larger than expected but August fell off abruptly and figures for early September showed same trend. So, actual demand for the quarter may not be much higher than the Bureau forecast.

Crude Demand Holds

Crude oil demand might be expected to decline, but the sharp drop in imports will throw this demand to domestic production, Bureau said.

"Until recently," the Bureau's report continued, "this increase in demand (for crude) was offset by continued liquidation of refined stocks that reduced crude runs to stills to a low level. When this liquidation of stocks ceases, total demand must be met from new production.

"Consequently, even with further curtailment of civilian consumption, the Bureau does not expect the demand for domestic crude to decline to any great extent in the near future," report said.

'Gas' Production Listed

Deducting 1,600,000 bbls. for sales of natural gasoline and adjusting for withdrawals from stocks, Bureau estimated refinery production of gasoline at 47,900,000 bbls. for October. This was broken down as follows:

Area	Barrels
Appalachian	1,900,000
East Coast, Inland Texas, Texas Gulf Coast, La. Gulf, La.-Ark.	21,300,000
Indiana, Illinois, Kentucky, etc.	10,850,000
Oklahoma	2,430,000
Kansas	2,870,000
Rocky Mountain	1,340,000
California	7,210,000
Total	47,900,000

Plant Protection Primarily the Job Of Industry Itself, Refiners Told

NPN News Bureau

TULSA — When the Army Air Corps inspects a facility engaged in war production, two main points are considered in working out the necessary protection requirements: "To increase the protection against fire, sabotage and interruption of production from other causes and to insure that the facility will remain productive to the war effort as well as be in position to operate after this war is over," according to Lieut. Col. A. H. Denison, air plant protection officer, Mid-Western District, Wichita, Kans. Col. Denison appeared before a question-answer meeting of more than 40 oil industry executives here Sept. 24, sponsored by Western Petroleum Refiners Assn.

Oil industry was repeatedly urged by Col. Denison to do everything possible itself. "The primary responsibility for plant protection rests on the operators, owners and local and state governments for the protection of essential industry," he told the group, adding: "If we stepped in and made the Army primarily responsible, it would be a direct superseding of states' rights, as well as a serious drain on military manpower."

He briefly outlined plans the Army has made for protection of essential industry from agents of foreign powers and then threw the meeting open to questions and discussion by the group, although his answers to many questions were, necessarily, "off the record" for military reasons.

With reference to safety, W. K. Holmes, superintendent of Texas Co.'s West Tulsa refinery, told the group "The danger point in 1943 will be the loss of well-grounded, experienced men to the armed forces. They will have to be replaced with inexperienced men—and women—which will mean redoubled precautions," he warned. Several refiners said they are now studying the jobs in which women can replace men, while some said they already were beginning to hire women.

J. C. Day, W.P.R.A. secretary, said a list of minimum requirements for plant protection will shortly be provided industry operators, and those who have been designated on the plant protection list by the War Department will receive a manual prepared by the department.

Mr. Day also suggested the group give serious thought to developing new ways of protecting plants, such as smokescreens, adding that even if such protection was not needed in this particular area, the coastal refineries do need it.

A.I.M.E. Oil Men to Meet

NPN News Bureau

NEW YORK—Two meetings of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers are scheduled for October. The first will be held in Los Angeles at the Ambassador Hotel, Oct. 15-16, and discussion will center around the study of modern recovery practice and factors affecting efficiency in production.

The second is scheduled for Oct. 29-31 in Austin, at the Stephen F. Austin Hotel. Assistant Deputy Petroleum Coordinator DeGolyer will deliver the principal address.

° ° °

Ickes to Address A.I.M.E.

NPN News Bureau

NEW YORK—Petroleum Coordinator Ickes will be the principal speaker at a dinner of the American Institute of Mining and Metallurgical Engineers at its annual regional meeting in the Hotel Statler, St. Louis, Sept. 30-Oct. 2. Rubber Coordinator Jeffers is also scheduled to speak.

Grease Institute Outlines Program For 10th Meeting

NPN News Bureau

CLEVELAND—The National Lubricating Grease Institute announces the program for its 10th annual meeting which will be held Oct. 26-28 in New Orleans at the Roosevelt Hotel. Program follows:

October 26

9:30 a.m.—Registration; address by President Sydney Bevin; address of welcome by Past President W. H. Saunders, Jr., of New Orleans; talk on "The Proper Application of Lubricating Greases to Machinery" by Charles Kraus, Alemite division of Stewart-Warner; speaker from American Red Cross, Washington.

2 p.m.—Talk entitled "Army Grease Developments" by Walter Ainsley, consultant on fuels and lubricants, Office of Chief Ordnance Division; a paper entitled "The Flow Characteristics of Lubricating Greases" prepared by A. Beerbower, L. W. Sproule, J. B. Patberg and J. C. Zimmer; to be delivered by Dr. Zimmer, Esso Laboratories; and a talk entitled "Low Temperature Characteristics of Greases" by Thomas A. Maxwell, International Lubricant Corp.

October 27

9:30 a.m.—Individual meetings of the various committees to be attended by committee members only.

2 p.m.—Address by Ralph Nicholson, publishers of the *New Orleans Item;* a talk entitled "Survey of Lubricating Grease Test Methods" by C. W. Georgi of Enterprise Oil and Grease Corp.; a speech entitled "The Railroad Aspect of Lubricating Greases," by Charles B. Bryant of Southern Railroad System.

7:30 p.m.—Annual Banquet.

October 28

9:30 a.m.—"A Review of Rust Preventives and Suggested Plan for Their Valuation," a talk by S. L. Bishkin of Humble Oil and Refining Co.; an address on "Change in Grease Manufacture which is Necessary Due to the Government's Need for Additional Quantities of Glycerine" by a U. S. government representative from Washington; a talk by O. L. Maag, Timken Roller Bearing Co., on "Lubricants for Anti-Friction Bearings in War Service."

2 p.m.—Annual business session for active members only; election of directors.

Propane Studied as the Break-in Fuel For Plane Motors Instead of Gasoline

NPN News Bureau

WASHINGTON—A proposal that propane be substituted for aviation gasoline as the fuel for breaking in airplane motors, on the block, is being studied here.

One motor manufacturer is reported to have tried out propane as a break-in fuel with satisfactory results. Several natural gasoline manufacturers also have made studies along this line.

Substituting propane for 100-octane and 91-octane for this purpose is being suggested as a means of conserving aviation gasoline for flight use only. There is plenty of propane. In fact, this product has come to be regarded as the "step-child" of the war program, so far.

Each Takes 630 Gal.

Approximately 15 bbls. (630 gal.) of aviation gasoline are required to break in a motor properly.

Every engine in the multi-motored warplanes, now being constructed in such great numbers, requires several replacements. So, it is apparent that switching to propane as the break-in fuel would release large quantities of aviation gasoline for other uses. And this is important because indications are that there will be a greatly-expanded demand for aviation gasoline during the war years ahead.

S.A.E. Nominates Officers

NPN News Bureau

NEW YORK—Three oil men are included among the officers nominated by the Society of Automotive Engineers for 1943. For vice-president, Diesel-engine division, Grover C. Wilson, Universal Oil Products Co.; vice-president, fuel and lubricant division, W. M. Holaday, Socony-Vacuum; and vice-president, tractor and industrial division, C. G. Krieger, Ethyl Gasoline Corp.

(American Petroleum Institute figures in barrels of 42 gallons. Figures are U. S. totals and are on a Bureau of Mines basis. Breakdown by districts will be published in Oct. 7 NPN.)

	Sept. 26, '42	Sept. 19, '42	Sept. 27, '41
Crude runs to stills (Da. avg.)	3,802,000	3,713,000	4,031,000
Gasoline production at refineries including natural blended	10,954,000	11,097,000	13,503,000
Finished & Unfinished gasoline stocks	80,550,000	80,793,000	80,005,000
Gas & distillate stocks	45,259,000	44,442,000	51,629,000
Residual fuel oil stocks	78,943,000	79,335,000	94,197,000

By the Hundreds

AMERICA'S LARGEST PLANTS

ADOPT G.T.M. INDUSTRIAL RUBBER CONSERVATION PLAN

Key executives acclaim Goodyear-developed procedure that can prolong life of rubber products as much as 50%. Get your plant started now. No charge.

With this 40-page manual, "Goodyear Industrial Rubber Products Conservation," your men have complete instructions for salvaging rubber products. It's furnished free - to designated operating men.

IN a few short weeks the Goodyear Rubber Products Conservation Plan has become American industry's first line of defense against the rubber shortage.

More than a thousand top operating men from major manufacturing companies have enthusiastically endorsed the plan, at meetings held, in fifty cities from coast to coast, by the G. T. M. — Goodyear Technical Man.

So impressed have they been by its rubber-saving possibilities, many asked the G.T.M. to come into their plants and explain the program in detail to the mechanical staffs. Upwards of 200 of these individual plant meetings have now been held, and many more are scheduled.

That is the verdict of industry on the Goodyear plan — a practical program for conserving your now almost irreplaceable rubber products and prolonging their life many extra months.

AVAILABLE TO ALL

The Goodyear conservation program consists of three simple, easy-to-follow steps:

"Goodyear Wages War on Waste" — a graphic, educational slide film which illustrates to your men, plainly and clearly, recommended conservation practices.

Practical plant demonstrations by the G.T.M. — what to look for, how to inspect and what measures to take to give hose, belts and other products longer life.

"Goodyear Industrial Rubber Products Conservation" manual — a fully illustrated 40-page book, telling exactly how to make repairs, and filled with suggestions for saving rubber — left with your operating men for their guidance.

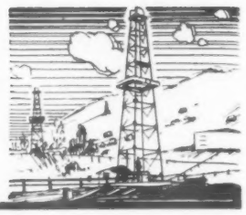
HOW TO GET THE PROGRAM

To have the G.T.M. hold a rubber conservation meeting at your plant, simply write us today, and a definite date will be set. There is no charge for this service; it is not necessary that you be a Goodyear customer — it is all part of Goodyear's effort to help the nation save rubber. To arrange for your meeting, or obtain copy of the manual, write: Goodyear, Industrial Conservation Dept. L-10 Akron, Ohio.

THE GREATEST NAME IN RUBBER

GOODYEAR
MECHANICAL GOODS

PRODUCTION NEWS



Allowables Basis To Be Discussed At Texas Meeting

Special to NPN

AUSTIN—A special statewide meeting of oil producers will probably be called to take testimony on the proposed plan to grant allowables on a lease rather than well basis.

Such a meeting was proposed by Beauford Jester, new member of the commission, who holds the deciding vote on the proposition. The lease plan, which means that the allowable for all the wells on a lease may be produced by one or more wells, was proposed by Chairman Ernest O. Thompson and opposed by Commissioner Olin Culberson.

Mr. Jester has refused to commit himself either way, and proposed that further testimony be taken.

"Both sides of the question were not adequately presented at the last statewide hearing," he remarked.

Invites Views

Mr. Jester said he has invited operators to write him their views on the subject, since "it's a big thing and we ought not to rush into it without carefully considering all the factors".

Chairman Thompson said he offered the suggestion on the basis that it would help operators cope with the growing problem of manpower and transportation shortages by simplifying operations and bookkeeping. Commissioner Culberson, however, at the statewide proration hearing, came out flatly against the proposal on the basis that it would wreck the "last vestige" of control over the oil industry by the state body.

It is believed that most oil men, judging by the reaction at the hearing, favor the lease plan.

Sadler's Suit Dismissed By Federal Judge

Special to NPN

AUSTIN—Lieut. Jerry Sadler, whose claim that he still holds his old post as Texas Railroad Commissioner finally landed in the courts, apparently has given up his attempt to oust Beauford Jester from the office.

His suit against Jester was dismissed by Federal Judge W. H. Atwell of Dallas, and so far neither Sadler nor his attorneys have made any attempt to refile it in the state courts.

'Chose Own Road'

The federal judge held that Sadler had resigned his post and accepted a commission in the Army, and that he "made his own choice and chose his own road."

"He (Lieut. Sadler) tendered his resignation to the governor, advising that official both in his resignation and in the press he had accepted a United States Army appointment. When he accepted the Army appointment, he put into operation the state statute which denied him the right to be a member of the Railroad Commission and at the same time hold another office," Judge Atwell said.

Arkansas Allowables Set For 3-Month Period

Special to NPN

EL DORADO—Basic allowable production for Arkansas of 73,107 b/d total of all petroleum liquids has been set for the 3-month period of October to December, according to A. M. Crowell, director of conservation and production, Arkansas Oil & Gas Commission. Basic figure is expected to be increased to 75,000 b/d before end of December by new production. Allowable is 1296 b/d below current quota, brought about by minor changes in allowables for 3 fields, Mr. Crowell told NPN. OPC set 79,500 b/d in its October recommendation.

Since the Texarkana gas condensate pool is a new discovery, application for fieldwide exception to M-68 will be made by the commission. Exception will provide for 160-acre spacing, permitting 18 wells to be drilled in the pool which covers approximately 2800 acres.

Louisiana Sets Allowables

Special to NPN

BATON ROUGE—Louisiana's October allowable for crude and other petroleum liquids has been set at 325,724 b/d, divided between 91,159 b/d for North Louisiana fields and 234,565 b/d for South Louisiana fields. This represents an increase of 3725 b/d from September, but is 11,476 b/d below OPC recommendation of 337,200 b/d.

Program Set for Annual Convention Of Texas Mid-Continent Association

Special to NPN

DALLAS—Texas Mid-Continent Oil and Gas Assn.'s annual meeting which opens Oct. 9 will be a streamlined war meeting, according to George Sawtelle, president of the association.

The entire business program will be confined to one day, Oct. 9, in keeping with conditions brought about by the war. Many oil men who have sent in registrations for the meeting, however, are planning to stay over in Dallas to attend the Texas-Oklahoma football game to be held at the Cotton Bowl Oct. 10.

Transportation and supply in Districts 1, 2 and 3 will be discussed by Dr. Robert E. Wilson, chairman of the economics of the Petroleum Industry War Council and president of Pan American Petroleum and Transport Co. Major General Richard Donovan, commanding the Eighth Service Command, Fort Sam Houston, will outline the functions of the Eighth Service Command and the co-operative efforts of the Texas oil industry in defense activities.

Knowlton to Speak

Mr. Sawtelle will present his annual report, combining the highlights of work done by various committees during the past year and set forth the problems now confronting the industry.

Donald R. Knowlton, OPC director of production, and D. E. Buchanan, regional director of OPC District 3, Houston, will outline the current situation and the part the oil industry is playing in the war effort. Both of these speakers will devote time to answering questions from the floor.

Lieut. Colonel Darnce B. Burns, chief of the manpower division of the U. S. Selective Service, Austin, Tex., will discuss the effect of selectice service upon the petroleum industry.

Many of the visiting oil men will take part in the annual handicap golf tournament to be played on the Brook Hollow Club course Oct. 10 The prize for this event will be the Hamilton Cup, which was won last year by Charles McCarthy of the Hydril Co., Houston.

Mid-Continent Tax Meeting Off

NPN News Bureau

TULSA—Mid-Continent Gas & Oil Assn. executive committees have cancelled the annual joint meeting of the standing tax committees on state and local taxation and on federal income and excise taxation, scheduled to be held the first week of December in San Antonio.

The meeting was called off because of transportation and hotel problems, and in response to the government's request that unnecessary conventions be curtailed for the duration.

Viola Limestone Drilling Allowed

Special to NPN

WICHITA—Application of Kansas State Corporation Commission for authorization to use material pursuant to provisions of paragraph (c) (10) of Conservation Order M-68, as amended, was reconsidered by WPB Sept. 22.

It was determined that the use of material required to drill to and complete in the Viola Limestone, Hendrickson & Schweizer Pools, Peace Creek Field, one or more wells at depths of approximately 3800 ft. is necessary and appropriate in the public interest and to promote the war effort, and authorization was granted, subject to following limitations:

"(1) Each such well shall be allotted a drilling unit consisting of a quarter-quarter section upon which no drilling or producible well other than such well is located.

"(2) Each such well shall be drilled in the center of the SE¼ of the drilling unit upon which it is to be located unless such well would be located within 990 ft. of any other drilling or producible well.

"(3) Each such well which, if drilled in the center of the SE¼ of the drilling unit upon which it is to be located, would fall within 990 ft. of any other drilling or producible well, shall be drilled in the center of the S½ of such drilling unit.

"The exception granted herein on April 18, 1942 is hereby revoked with respect to the above described portion of the Peace Creek Field except as to wells which were spudded thereunder prior to the receipt hereof."

Oil TRANSPORTATION

Tank Truck Use Over 100 Miles Hit by Eastman

NPN News Bureau

WASHINGTON — ODT Director Eastman is threatening to "crack down" on tank truckers, who reportedly abandoned short hauls for longer trips, by requiring permits for all tank truck shipments of more than 100 miles.

His threat was made clear in a statement issued on Sept. 26. While he only said permits "might" be required, his statement was firmly worded.

Exception Order 7-2 which, in effect, extended from 100 to 200 miles the radius in which tank cars may not operate without a special or a general permit, was not designed to divert oil shipments between 100 and 200 miles to tank trucks at the expense of the shorter haul, he said.

"The principal duty assigned to the operators of tank trucks," Mr. Eastman emphasized, "is to take over all shipments of petroleum and petroleum products by rail of 100 miles or less and to engage in longer movements only when the availability of tank trucks permits."

Eastman Statement Quoted

Mr. Eastman's statement follows:

"The conversion of tank car movements between 100 and 200 miles to tank trucks at the expense of abandoning shorter hauls by truck was not the purpose of ODT Exception (7-2) to General Order No. 7.

"The principal duty assigned to the operators of tank trucks is to take over all shipments of petroleum and petroleum products by rail of 100 miles or less and to engage in longer movements only when the availability of tank trucks permits. The present supply of rubber and tank trucks will not justify a general expansion of tank trucks facilities to handle all shipments between 100 miles and 200 miles. Shippers of petroleum and petroleum products should convert to tank truck, with the minimum of delay, all remaining tank car shipments of 100 miles or less that it is practical to convert.

"When all shippers have accomplished this, then, and only then, should shipments beyond 100 miles be made by tank truck. Unless the shippers and haulers cooperate to bring about the use of tank trucks for the hauls for which they are most efficient, it may become necessary to apply the permit system to tank trucks for distances over 100 miles.

Reason for Order 7-2

"The principal reason for the issuance of ODT Exception Order 7-2 to General Order Number 7 was to divert, for movement into the East Coast area, tank cars having a shell capacity of 7000 gal. or better and to use the smaller cars to replace the larger ones. It was considered necessary to expand the tank car permits to 200 miles to secure a sufficient number of larger capacity tank cars for the eastern movement and to place tank cars having a shell capacity of less than 7000 gal. in the shorter hauls and in those services for which they are specially adapted, such as the transportation of lubricants.

"A further reason for extending the mileage radius of the permit system was to prevent certain injustices that had arisen in cases where those who had cooperated by converting to tank trucks found that this resulted only in the loss of their customers to those who could ship by tank car over distances somewhat longer than 100 miles.

"I want to emphasize that shippers who have movements between 100 and 200 miles which cannot be converted to tank truck without eliminating tank truck movements of less than 100 miles should make application to the Office of Defense Transportation for tank car permits."

Oil Accounts for 13 Per Cent Of Truck Movement

NPN News Bureau

WASHINGTON — Petroleum products accounted for 13% of total tonnage moved by motor carriers in August, according to truck loading index compiled by American Trucking Assn., Inc. Volume moved in August by petroleum transporters showed a decrease of 13.4% under July but held 44.1% above August, 1941, A. T. A. reported.

'War Needs First' is Guide In Setting Car Priorities

NPN News Bureau

WASHINGTON—Tank car priorities as developed by WPB may be placed in effect through extension of ODT's present permit system for controlling tank car movements.

ODT officials do not believe an order specifically establishing the priorities will be necessary, pointing to the fact that the original tank car order—General Order ODT No. 7—reserved power for ODT to say which commodities tank cars should carry and where they should be operated.

WPB's broad directive on tank car priorities (*NPN Sept. 23, p. 8*) was announced formally on Sept. 24, directing ODT to grant preference to tank car shipments according to the WPB outline which was designed to free tank cars for chemicals and vegetable fats and oils—principally at the expense of automotive gasoline.

WPB Rates Use of Cars

WPB called its action a Certification of Necessity for Priority Action No. 1, relating to tank cars. It was compiled by the transportation committee which found priority action along the following lines necessary:

Class A—Transportation of any material for Army, Navy, Maritime Commission, War Shipping Administration, and Lend-Lease.

Class B—Transportation of nearly 400 petroleum products, chemicals, fats, oils, milk, including alkylates, asphalt, aviation gasoline of 87, 91 and 100 octane, benzene, butadiene, butane, butylenes, fuel oil for locomotives, helium, isobutane, codimers, naphtha, naphtha solvents, isobutylene, propane, rapeseed oil, isooctane, paraffin wax, styrene, isopentanes and toluol.

Class C—Transportation of petroleum and petroleum products into District 1 and into or within Washington and Oregon—the kinds and quantity of each to be set by OPC in a certification subject to WPB review and countersignature.

Class D—Transportation of petroleum and its products, except automobile gasoline, within District 1 and into or within the other 4 districts except Washington and Oregon. Here, again, OPC will specify the kinds and quantities, subject to WPB review and countersignature.

Class E—Transportation of automobile gasoline within District 1 and into or within the other 4 districts in relative quantities certified by OPC subject to WPB approval.

Divert to Non-Gasoline Use

WPB specifically told ODT to divert tank cars from automotive gasoline, to meet the priority schedules, after using all available idle cars. The automobile gasoline tank cars are to be diverted from service in Districts 2, 3, 4 and 5 as determined by OPC subject to WPB review and countersignature.

It is understood, WPB said, that OPC shall direct purchases, sales, exchanges or loans of petroleum products and to arrange for common use of terminals or distribution facilities as may be required to carry out its functions under the directive. WPB was specific in saying that OPC's action should be in accordance with President Roosevelt's letter of May 28, 1941, which established OPC.

Only materials specified in the 5 classes may be shipped by tank car. Other commodities must be covered by special permits issued by ODT.

Coordinate with Trucks

ODT was directed to secure maximum coordination of tank cars with barges, tankers, pipelines, and tank trucks.

Transmitting the certification of necessity to Mr. Eastman on Sept. 16, WPB Chairman Nelson said the directive was designed to give ODT "operating flexibility", and added that it would thus be possible to eliminate back hauls, operate a maximum number of solid trains, coordinate tank car shipments with other means of transportation.

ODT quickly interpreted the directive as "a specific mandate to distribute the nation's 143.000 tank cars on a basis of first-needs first",

HOW THIS 13 YEAR SUCCESS STARTED FROM AN IDEA AND A FRIENDLY TIP!

JESSE L. BARRETT and JOHN A. BARRETT, Owners of The Barrett Service.

E.L. BARRETT
JOHN A. BARRETT

THE BARRETT SERVICE
NEWBERRY, MICHIGAN

August 10th, 1942

Mr. A. H. Sus
Sinclair Refining Company
2540 West Cermak Road
Chicago, Ill.

Dear Mr. Sus:

One of your representatives asked us how we happened to go into the oil business and why it was we picked Sinclair products. Well, we'll tell you. Some 13 years ago I finished college and my father thought it would be a good idea to start a new business enterprise for me to operate. He had been in the logging business here for many years and figured there was an opportunity in the oil business.

We knew a little about one oil company -- not Sinclair -- and we pretty near made up our minds to handle their products. Then we visited an old friend in lower Michigan, Mr. Reeder, who was a Sinclair distributor and still is today. We asked him about his business and he gave us detailed figures showing his revenue and his expenses. He wound up by saying, "I just couldn't think of having you take on any other brand than Sinclair." We said, "Why?" and he added conclusively, "You never could hook up with any outfit that's cleaner to deal with than Sinclair."

We got in touch with Sinclair and were well impressed with your representatives and your products. That was in 1929. Today we can repeat exactly what Reeder told us then. Sinclair is a fair and square outfit.

We were pioneer Sinclair people here as you know. Sinclair had little, if any, distribution in the upper Michigan peninsula when we started. But your many years of national advertising have made "Sinclair" well and favorably known. We started out with one station. Today we have 18 retail outlets, a half dozen logging accounts and the biggest share of the farm business.

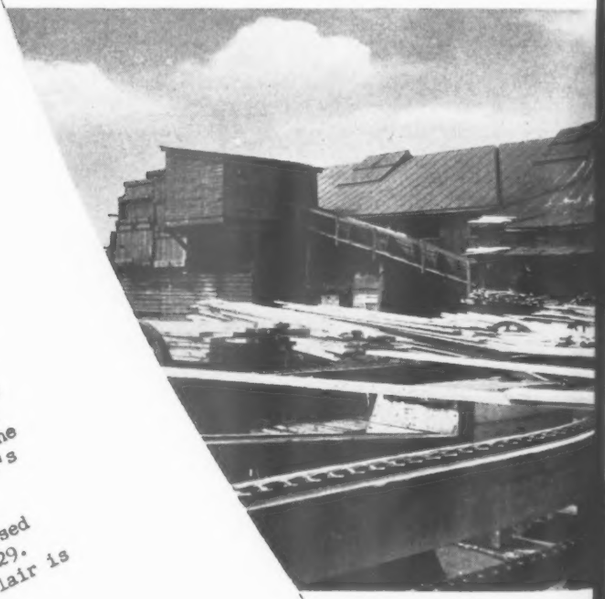
We have enjoyed doing business with your company, Mr. Sus, and we can recommend you, your people and your products without reservation. As soon as times become normal once more, we look forward to further growth with Sinclair.

Very truly yours,

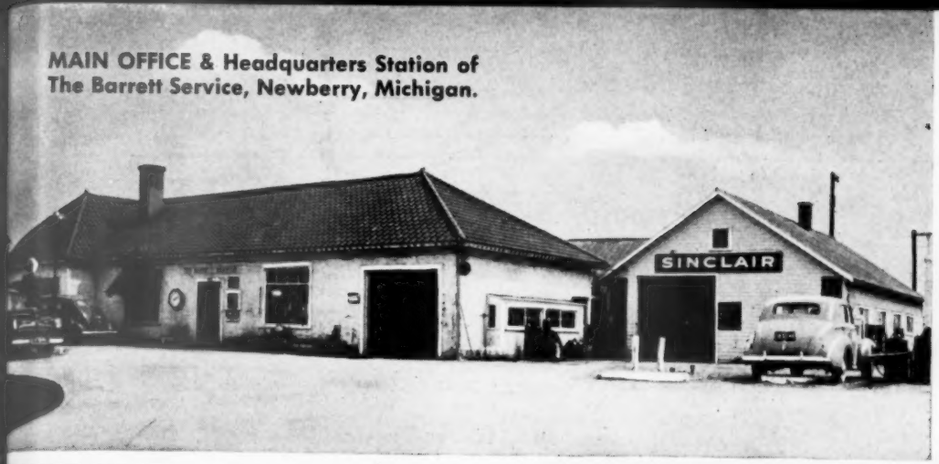
David Barrett

Sales Agency for
WILLIAMS OIL-O-MATIC OIL BURNERS
ZENITH RADIOS

REFRIGERATORS
GAS RANGES TIRES
RADIOS



SCENES in The Barrett Service Lumber Mi... Newberry, which ha... dles 20 to 25 thousa... board feet ... lumber ... da...



MAIN OFFICE & Headquarters Station of The Barrett Service, Newberry, Michigan.

RAY STAMPFLER'S Station, McMillan's Corners.

BLANEY PARK SERVICE STATION, Blaney, Mich.

(below) MR. & MRS. WALTER DUQUETTE who run the Blaney Park Station.

BILLBOARD on Route M 28A, Newberry. The Barrett Service is wholeheartedly behind the war program. In the recent scrap rubber drive nearly 30 tons were collected.

ROBERTS STATION & Cabins on Highway 28.

STORAGE TANKS at The Barrett Service Bulk Plant.

LAKEFIELD Cheese Factory, General Store & Filling Station, Lakefield.

NORTH LAND DINER & Filling Station, Helmer.

For full particulars about the value of a Sinclair franchise, write the Sinclair office nearest you.

SINCLAIR

2540 W. Cermak Rd. CHICAGO | 573 W. Peachtree St. ATLANTA | Rialto Bldg. KANSAS CITY

Fair Building FT. WORTH | 10 W. 51st St. NEW YORK

SINCLAIR REFINING COMPANY (Inc.) 630 Fifth Avenue, New York, N.Y.

asserting that it viewed the certification as a direction to give preferential treatment to chemicals and vegetable fats and oils which are important war materials.

Vegetable Oil Use Grows

October-November peak demands for transportation of vegetable fats and oils will be 25% heavier than during the same period last year, ODT said.

There are now 6000 tank cars hauling such commodities as cottonseed, linseed and peanut oils, lard, tallow and grease. Another 2000 will be required.

On top of this, demands are rising for tank cars to move butadiene to rubber plants and alcohol to smokeless powder plants. ODT estimated another 1500 cars would be needed for this service.

"Essentially," ODT said, "the major task here is one of coordination and allocation. Cars moving petroleum cannot at the same time carry cottonseed oil to processors and consuming centers, or transport toluene to explosive plants. The tank cars must be distributed on the basis of the service most vital to the war effort."

Full Text of Tank Car Priority System

NPN News Bureau

WASHINGTON — Following is complete text of the "Certification of Necessity" which WPB sent to ODT instructing the latter agency to set up a system of priorities on tank cars:

Certification of Necessity for Priority
Action No. 1
Tank Cars
September 16, 1942

Pursuant to the provisions of Executive Order 8989 and War Production Board Regulation No. 1, as amended, the undersigned hereby certifies to the Office of Defense Transportation that priority action as indicated below is essential for certain materials and commodities transported in tank cars (whether owned by railroads, shipper owned, or operated under leases):

(A) Preference shall be given to the uses described in Classes A, B, C, D, and E in that order.

CLASS A

Transportation of any material consigned to or for the account of the Army or Navy of the United States, the Maritime Commission or the War Shipping Administration. Transportation of any material which has been procured pursuant to the act of March 11, 1941 (Lend-Lease Act), in the form in which it is to be delivered to the representatives of a foreign country, whether before or after delivery to such representatives. (The foregoing shall not include transportation to any privately operated plant, regardless of the extent to which such plant may be engaged in war work.)

CLASS B

Transportation of the materials listed in schedule one attached hereto. (A list of 390 chemicals, Ed.)

CLASS C

Transportation of petroleum and petroleum products into District 1 (as defined by the Office of Petroleum Coordinator for War), including movements from the Plantation and Southeastern pipeline terminals and from Gulf and inland-water terminals within District 1 which are part of through movements into District 1, and into or within the states of Washington and Oregon; of such kinds and in such relative quantities as may be certified to producers, refiners, suppliers or distributors from time to time by the Office of Petroleum Coordinator for War, subject to the review and countersignature of the undersigned.

CLASS D

Transportation of petroleum and petroleum products, other than automotive gasoline, within District 1 and into or within Districts 2, 3, 4, and 5 (as defined by the Office of Petroleum Coordinator for War), except the states of Washington and Oregon; of such kinds and in such relative quantities as may be certified to producers, refiners, suppliers or distributors from time to time by the Office of Petroleum Coordinator for War, subject to the review and countersignature of the undersigned.

CLASS E

Transportation of automotive gasoline within District 1 and into or within Districts 2, 3, 4, and 5 (as above) in such relative quantities as may be certified to producers, refiners, suppliers or distributors from time to time by the Office of Petroleum Coordinator for War, subject to the review and countersignature of the undersigned.

(B) To the extent that diversion of tank cars by ODT is required to give effect to the foregoing priorities, after using available idle cars, such diversion shall, so far as practicable, be at the expense of transportation of automotive gasoline into or within Districts 2, 3, 4, and 5 (as above), as determined by the Office of Petroleum Coordinator for War, subject to the review and countersignature of the undersigned.

(C) It is understood that the certifications referred to under Classes C, D, and E above shall be such certifications (subject to review and countersignature of the undersigned) as OPC may issue, pursuant to the duties and responsibilities imposed by the letter of the President of May 28, 1941, and upon determination of the sources of supply and distribution of petroleum and petroleum products to consuming points so as to maintain necessary supply and distribution thereof and to avoid undue hardship upon producers, refiners, suppliers, distributors and purchasers; and that, in order to attain these objectives, the OPC will direct persons engaged in producing, refining or distributing petroleum or petroleum products to make such purchases, sales, exchanges or loans of petroleum or petroleum products (except as the same may be subject to the rationing authority of the Office of Price Administration or to review by the War Production Board) and to arrange for such common use of terminals or distribution facilities as may be required in order to attain the most efficient utilization of all such facilities, subject, in each case, to any applicable orders or regulations of the War Production Board heretofore or hereafter issued.

If it becomes necessary from time to time to discontinue or establish certain movements to effectuate the above, the undersigned may in his discretion issue to you further certifications with respect to the transportation of petroleum or petroleum products.

(D) No materials other than those specified under Classes A, B, C, D, and E above shall be shipped by tank car except pursuant to special permit issued by you with the approval of the undersigned as to the material to be transported.

(E) It is understood, that in giving effect to the foregoing, you will secure maximum coordination of the use of tank cars with the use of pipelines, tank ships, barges, and tank trucks in order to facilitate the delivery of the maximum amount of products with the available means of transportation and within the limits of this certification, that you will make such provision for emergencies and other exceptional cases (to be promptly reported to the undersigned), and that you will impose such conditions with respect to loading, unloading, consolidation and terminal delivery of tank cars, or routing, availability of other means of transportation, and any other matters as you may deem appropriate in exercising the authority granted to you by Executive Order 8989 of December 10, 1941.

(F) Nothing herein shall be construed to modify the prohibitions of any conservation, limitation or other order or regulation of the War Production Board, heretofore or hereafter issued.

Director General for Operations

Here's Committee That Drew Up Tank Car Priority System

NPN News Bureau

WASHINGTON — The schedule of tank car priorities Donald Nelson certified to the ODT was drawn up by the WPB transportation committee which has the job of determining total transportation requirements and preparing systems of priorities.

The committee is composed of 6 men, supplemented by advisers and commodity consultants, who have charge of transportation policy for WPB and its forty one commodity and industry branches.

Along with the policy making job, the committee is a "clearing house" for all domestic transportation problems involving WPB as well as problems arising between WPB and ODT.

Industrial readjustments due to wartime economy revolve around transportation problems which the committee is seeking to resolve through appointment of transportation advisory committees by each WPB industry branch chief.

The advisory committees would aid in evaluating transportation needs of industry, study commodity movements as a prelude to curtailment of nonessential transportation and to promote maximum freight car loadings.

WPB's transportation committee views its job as a task of minimizing the use of transportation—an undertaking it hopes each industry will do before priorities are ordered.

Committee Named

Chairman of the committee is A. F. Shafter, general manager of the U. S. Manufacturing Corp., Decatur, Ill., who has been a special assistant on transportation to WPB's director general for operations.

B. H. Taylor is vice-chairman. He is from Chicago. For two years, he has been associated with the Central Freight Assn., comprised of eastern railroads. Before that, he was traffic vice-president of Denver and Rio Grande Western Railroad and assistant traffic vice-president of the Chicago, Burlington and Quincy Railroad.

Committee Staff Listed

W. E. Seatree, senior member of the firm of Price, Waterhouse and Co., is executive assistant to the chairman and chief of the requirements and studies section.

The inland waterways specialist is J. D. Beeler, Evansville, Ind., who has been vice-president and general manager of the Mead-Johnson Terminal Corp. and of the Commercial Barge Lines.

William I. Nokely, former traffic manager of the Michigan Alkali Co., Wyandotte, Mich., is assistant chief of the transportation and traffic section which is headed by Mr. Taylor.

Harold D. Kube, a former Census Bureau economist, is assistant chief of the requirements and studies sections.

Advisors Appointed

Advisors to Chairman Shafter are Arthur C. Schier, general traffic manager of General Foods Corp., New York, and William J. Bailey, general traffic manager for the West Virginia Pulp and Paper Co. at New York.

T. C. Burwell, vice-president and general traffic manager of A. E. Staley Co., Decatur, Ill., is a consultant on grain movements.

R. J. Newberry, general traffic manager of the Johns-Manville Corp., New York, is a consultant on building materials.

I. F. Lyons, traffic manager of the California Packing Corp., San Francisco, is a consultant on vegetables and fruits.

The committee plans to name additional commodity consultants from time to time.

Rails Act to Speed Return Of Empty Tank Cars

NPN News Bureau

WASHINGTON—Plans are being made to speed up the return of empty tank cars which reach the Eastern Seaboard in solid train lots, according to railroad officials.

While empties are moving about as good as loaded cars, rail men report that efforts are being made to assemble empty cars at the original break-up point for solid train movement back to point of origin.

Liberty Ship Contracts Changed to Tankers

NPN News Bureau

WASHINGTON—Rising production of Liberty ships has made it possible for U. S. Maritime Commission to divert some existing shipbuilding facilities from cargo ship to tanker construction.

As the first move in putting the new policy into effect, the commission changed a contract with the W. A. Bechtel Co., Sausalito, Calif., which will make 22 tankers instead of Liberty ships.

First tanker under this new policy will be completed next May. The other 21 ships will be delivered by the end of 1943. Of the T2-SE-A1 design, the tankers are 523 ft. long, 68 ft. in the beam, and 39 ft. in depth.

Rail Haul to East Hits 856,710 B/D

NPN News Bureau

WASHINGTON—For the second consecutive week tank car shipments to the East have set a new high. During the week ending Sept. 19, rail shipments averaged 856,710 b/d, an increase of 18,270 over the previous week's average, OPC reported. Thirty-seven companies loaded 28,557 cars. Breakdown follows:

Allied, 23 cars; American Bitumuls, 74; Amsco, 233; Arkansas Fuel, 248; Ashland Oil & Refining, 154; Asiatic, 25; Atlantic, 3088; Aurora, 37; James B. Berry Sons, 2; Canfield, 3; Chalmette, 50; Cities Service, 1545; Continental, 294; Crown Central, 8; Daugherty, 1; Gulf, 2160; Hartol, 331; National Refining, 5; Old Dutch Refining, 3; Pan American, 2003; Petrol Corp., 324; Petroleum Heat & Power, 285; Phillips, 70; Pure, 321; Roosevelt, 5; Royal Petroleum, 7; Shell, 1216; Sinclair, 2615; Socony-Vacuum, 3091; California Standard, 68; Kentucky Standard, 265; New Jersey Standard, 4811; Ohio Standard, 49; Sunoco, 1979; Talco Asphalt & Refining, 51; Texaco, 2403; and Tide Water, 710.

Equipment Defects Hamper Rail Hauls to East

NPN News Bureau

CLEVELAND — Equipment defects in tank cars are one serious cause for delay in East Coast petroleum shipments, according to *Railway Age*, quoting from an Assn. of American Railroads report. The report stated that an analysis on one road which shipped 4262 cars in one month showed the following defects: Trucks: (other than wheels), 1382 cars; wheels, 1242 cars; couplers, draft gears and attachments, 596 cars; air brakes, 430 cars; and miscellaneous, 612 cars.

Careful inspection both before and after unloading is stressed as the most important remedy for this condition. Necessary repairs should also be made promptly, particularly on leaky tank cars. To facilitate this, the A. A. R. mechanical division has revised interchange rule 2, par. 3, sec. (b), effective immediately, to require stenciling which shows location of leak, notification of car owner by wire anud issuance of necessary authorization for repairs, by wire, within 48 hours.

Tank Car Mileage Doubled, Maloney Group Finds

NPN News Bureau

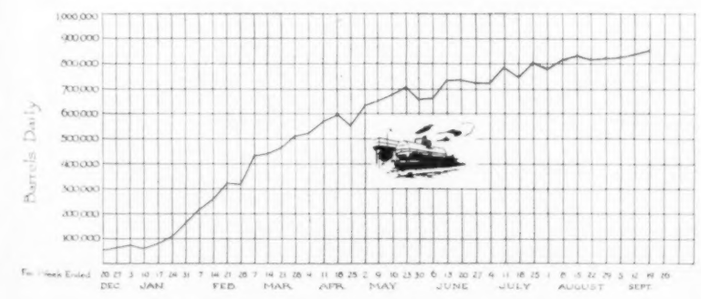
WASHINGTON—Maloney Committee investigating gasoline and fuel oil shortages for the Senate concluded its investigation of tank car transportation with a report on Sept. 25 which said average daily tank car mileage was 54.1 in January and 115 in June.

The committee started the tank car investigation by sending out questionnaires last November.

RFC Extra Cost Forms Ready on October 1

NPN News Bureau

WASHINGTON—Forms for applying for reimbursement of extra costs of supplying oil to East Coast by means of non-tanker transportation, under the RFC compensation plan, will be available about October 1. (*For text of RFC plan see NPN Sept. 9, p. 34—Ed.*)



Oil hauled by tank car to East Coast

Here's Data Applicants Must Provide To Get War Certificates for Trucks

NPN News Bureau

WASHINGTON—A preview of the type of information required on applications for Certificates of War Necessity under General Order ODT No. 21 was contained in an ODT statement of Sept. 25 which said the applications would provide a "complete inventory" of all tires on the wheels of non-military commercial vehicles or held for their use.

On the application, the trucker must state the number and condition of all tires in his possession—both new and used—in addition to reporting the mileage of tires removed from service in 1941, except retreads and recaps, which will give ODT an indication of normal consumption of new tires by commercial vehicles.

Different types of application blanks will be mailed soon to fleet operators and truckers with only one or two vehicles.

Mailed from Detroit

Mailing will be done from ODT's central mailing office in Detroit. As mailing is completed for each area, the counties covered will be announced. A trucker who has not received his application by the time of announcement that his county has been covered should apply to the nearest ODT field office for a blank.

Operators of both tank trucks and dry freight vehicles should apply for separate certificates on each type of operation.

Type of Data Sought

Here is the additional information called for on the applications:

"Type of business for which vehicles are operated.

"Purposes for which the vehicles are principally used, such as farming, service, transportation of passengers, transportation of workers or patrons or transportation of articles (to be specified by applicant).

Area of operation—local or over-the-road or both.

Nature of operation—distribution or other.

Cities where vehicles are operated.

Territory of over-the-road operations.

Number of vehicles owned; number of vehicles leased or rented; names and addresses of persons to whom any vehicles are regularly leased or rented.

Complete data on past operations and estimated future operations by quarters—July, August and September of 1941 and 1942; October, November and December of 1941 and 1942; January, February and March of 1941 and 1943; April, May and June of 1941 and 1943—and for the entire 12 months of 1941 and July through June of 1942-1943, including:

Miles operated quarterly by vehicles owned and vehicles leased to and from others.

Vehicle miles quarterly for special deliveries and call backs.

Vehicle miles quarterly under exemptions and permits.

Trips operated quarterly.

Average load per trip, in terms of tons, cubic foot or other units.

Average unit capacity of vehicle in tons, cubic feet or other.

Average load in terms of percentage of capacity of vehicles.

Coverage of ODT Orders

Operators also will be required to specify what ODT orders are applicable to their operations, special or general ODT permits applicable to their operations and what steps have been taken to reduce mileage, conserve equipment and tires and comply with ODT orders.

Those operating in an area where gasoline is rationed are required to state what percentage of total operations is in such area, how many gallons of gasoline they were allowed by their rationing boards and for how many miles, how much gasoline was used in the rationed area from July 22, 1942, to Sept. 23, 1942, and how many miles were operated in this period.

Fleet operators, as well as single unit operators, are required to describe in detail all vehicles for which a Certificate of War Necessity is required.

An individual certificate will be issued for each self-powered vehicle in the United States and must be carried on the vehicle.

Records of operation, subject to ODT inspection, must be kept by all operators affected by the order, which becomes effective Nov. 15.

May Make Truckers' Fines Deductible From Tax

NPN News Bureau

WASHINGTON — Internal Revenue Bureau is considering issuing an interpretation of income tax regulations which would permit truck operators to deduct from gross income fines, fees and assessments resulting from violation of state size-and-weight laws.

Bureau spokesman indicated that, in some individual cases, it has already ruled that such payments can be classed as "operating expense".

It is against Bureau's policy to release any information on a ruling involving a specific taxpayer. However, such a ruling may be promulgated soon, stating under what circumstances such items may be deducted.

Join the Minute Men

of Freedom *NOW!*

Independents! Get in this fight to preserve your Freedom of Enterprise

Write, wire or phone your Senators and Congressman to support the Ellender-Patman Bills!

• Since the first "call to arms" appeared in these pages, countless independent dealers have become Minute Men in a vast army fighting for the survival of Freedom of Business Enterprise.

They are battling for *your* business freedom because *your* very business life may depend on the passage of the Ellender-Patman Bills (Bill S-2560 in the Senate and Bill HR-7156 in the House). These bills will not only help keep alive one of the fundamentals of the American way of life—Freedom of Enterprise—but will make all independents who sell tires the key men in Uncle Sam's giant program to keep 20,000,000 cars rolling for the duration of the war.

You have a stake in this fight. So join the Minute Men now—*TODAY! Write, wire or phone your Senators and Congressman to support these vital bills.*

"It's YOUR Fight"... A recorded message every Independent should hear

You owe it to yourself to hear this recording now, for it gives you a point by point explanation of how the Ellender-Patman Bills will help you stay in business—and stay free! It gives you the other side of the picture too ... explains how and why you and all other independents will suffer if these bills do not pass.

Don't delay—no matter what make of tire you sell, phone the Seiberling Dealer nearest you and arrange to hear this vital message TODAY. Or, if you prefer, a recording will be sent direct to you without charge. Just write the Seiberling Rubber Company, Akron, Ohio.

Important Provisions of Senate Bill S-2560 and House Bill HR-7156

1. **PRESERVATION** of the independent dealer and his organization by providing for the distribution of new and rebuilt tires and tubes *through independent dealers and service stations ONLY.*
2. **A COMPULSORY TIRE INSPECTION PROGRAM** authorizing "*independent tire dealers and service stations*" to act as official inspectors.
3. **A CAPPING PROGRAM** providing for the capping—*by independent dealers only*—of 30,000,000 tires a year with reclaim capping stocks.
4. **PRICE STABILIZATION**—making present ceiling prices the bottom prices and requiring every purchaser to turn in an old tire, *with no discounts or allowances.*

DEDICATED TO THE FIGHT FOR FREEDOM OF ENTERPRISE

BY J. P. SEIBERLING, PRESIDENT OF SEIBERLING RUBBER COMPANY

Safety Rules Waived in Special Cases To Permit Unloading Direct to Trucks

NPN News Bureau

WASHINGTON—While the ICC and the Assn. of American Railroads are willing in specific instances to relax safety regulations on unloading fuel oil from tank cars, for the time being they are not going to lower the restrictions.

Each case will be decided on its own merits, provided a reasonable degree of safety is possible and the relaxation of rules aids the war effort.

The ICC and the rails have arrived at an understanding through informal talks and have agreed upon a method of procedure for handling cases in which exceptions are to be made.

ICC takes the view that in an emergency a limited amount of risk can be taken that would be unnecessary in normal times. The railroads are going along with this attitude.

Tank truck operators and consignees who have a real argument for unloading from tank cars to trucks can present the facts to the ICC. A number of appeals already taken to the ICC have found the rails in a co-operative mood.

Must Be Supervised

ICC insists that such "irregular" unloading must have competent supervision, be at a safe distance from any buildings, and on a siding where other traffic is not hindered or endangered.

In a recent outstanding case, the haul from the established storage tank to the war project was about 25 miles over a rocky road. By unloading direct into trucks farther down the track in open country, the trucks would have a good road and could cut the haul to about 10 miles —a material saving in time and tires. The local railroad readily agreed to the change, and ordered an inspector to look into the safety factors involved.

To Waive Rules

Both the ICC and the railroad association believe that such cases can be handled by waiving the rules. For the present they prefer not to lower the existing safety regulations, feeling that they have full control of the situation and that they will not be criticized for making special exceptions where conditions warrant.

In many instances, much time can be saved by unloading directly to tank trucks.

In some instances it is claimed that whole trains of tank cars can be unloaded by portable pressure pumps, moved from car to car, in less time than would be required to unload one car into permanent storage. This, of course, is illegal under existing ICC regulations. The ICC points out that the tank car may be "sprung" if the oil is forced out as the walls are made to stand only 60 lbs. pressure. The proper method, according to ICC, is to let the oil run to the pump by gravity.

Substitution Rule Up for Discussion At Dallas Hearing

Special to NPN

DALLAS—Proposal No. 6840-TX by carriers to amend IC-Y&MV Tariff 110-series, I&A Tariff 510-series, Mo. Pac. Lines Tariff 9953-series, T&NO Tariff 826-series, and T&P Tariffs 323-series, 266-series, 123-series, 181-series and 403-series, scheduled for public hearing before Texas Section, Texas-Louisiana Freight Bureau, Oct. 6 at 10:00 a.m. at Bureau Headquarters, Dallas, calls for revision of the various substitution rules contained therein to read as follows:

"The transit operator will not be required to preserve the identity of each carload shipment of the transit commodity unloaded into the storage facility, but will be required to preserve the identity of the total quantity of such transit commodity unloaded into the storage facility (as determined by the unloading and storage records which the Transit Operator shall maintain for that purpose), whether the transit commodity be mixed or blended (if such privileges are authorized) with another transit commodity or commodities of a different character, or with non-transit commodities of the same or of different character. In the transit operations authorized by these rules there shall be no substitution of a transit commodity of one character for another of a different character. That is to say, in the accounting of tonnage received and reshipped, the transit character shall, for example, be that of Gasoline, NOIBN, for Gasoline, NOIBN; Gasoline, Casinghead, for Gasoline, Casinghead; Refined Oil Illuminating or Burning, for Refined Oil, Illuminating or Burning; Lubricating Oil for Lubricating Oil; Benzol for Benzol; Toluol for Toluol; Xylol for Xylol, etc., whether or not such commodities are mixed, blended, manufactured or reprocessed, etc. (if such privileges are authorized and exported or moved coastwise under the description of the resultant product.

"NOTE: Where losses account evaporation or wastage are sustained in the transit operation, the actual amount of such losses will be deducted from the total quantity of the commodity received; and shall be determined by the transit operator by gauging the storage tanks and by maintaining records of evaporation and wastage, which shall be subject to verification by the Western Weighing and Inspection Bureau and/or other duly authorized representatives of the Carriers."

Oil Pushes Efforts to Get New England More Fuel

NPN News Bureau

WASHINGTON—Nine eastern oil companies have assured OPC that they are redoubling their efforts to get additional fuel oil supplies into New England. This was in response to a telegram sent out Sept. 21 by Deputy Co-ordinator Davies reading as follows:

"Sufficient heating oil is not moving into New England area. It is imperative that tank car shipments to New England states be immediately increased. As emergency measure we call upon you to cut your gasoline shipments into District One and increase your fuel oil shipments to New England, also to arrange diversions from other District One areas in favor of New England. Total petroleum movements into this area must increase at once if disastrous situation is to be averted. Please wire immediately what action we may expect from you."

At OPC it was explained that this plea by Mr. Davies was an interim action, pending approval of the East Coast pooling plan.

1950 Tank Cars Allocated

NPN News Bureau

CLEVELAND—WPB's final allocation of the remainder of the 1942 freight car building program—18,000 cars—provides for 1950 tank cars. Seven hundred eighty-six were released to Shippers Car Line, and 1164 to various other private car lines. As of Sept. 1, 13,310 of the total 18,000 cars were undelivered, according to *Railway Age*.

Canadian Motorists to Get Cut in 'Gas' Ration

Special to NPN

OTTAWA—All motorists in Canada who hold "A" gasoline rationing books and who use their cars for personal transportation not in pursuit of their business will receive a cut in gasoline supply. Light cars will receive only 16 units of 4 gal. each; medium cars, 18 units; and heavy cars 20 units.

The new category will be classified as "AA" and is estimated to include 225,000 car owners.

Order is effective on Oct. 1.

Texas-California Pipeline Needed, Thompson Asserts

Special to NPN

AUSTIN — Chairman Ernest O. Thompson of the Texas Railroad Commission believes that an impending shortage of crude on the West Coast may be averted if one of the pipelines now running from West Texas to the Gulf Coast is dug up and relaid to California.

Not only will this solve what he said was an oil shortage in California, but it will afford New Mexico and the West Texas fields with an outlet for their crudes, which have been moving very slowly due to the glutted condition on the Gulf.

Production Below Quota

Mr. Thompson cited OPC figures showing California is running about 50,000 bbls. weekly under OPC recommendations, and declared that Texas alone can bridge the gap between Pacific Coast production and the increased consumption there due to war activities.

For the week ending Sept. 19, Mr. Thompson pointed out, California produced 748,300 bbls. of crude compared with the OPC recommendation of 791,500 bbls. and for the week preceding that production totaled 747,000 bbls. compared to the OPC estimate of 791,500.

He declined to say which line he believes should be taken up and relaid.

Canadian 'Gas' Sales Drop, Other Oil Use Rises

Special to NPN

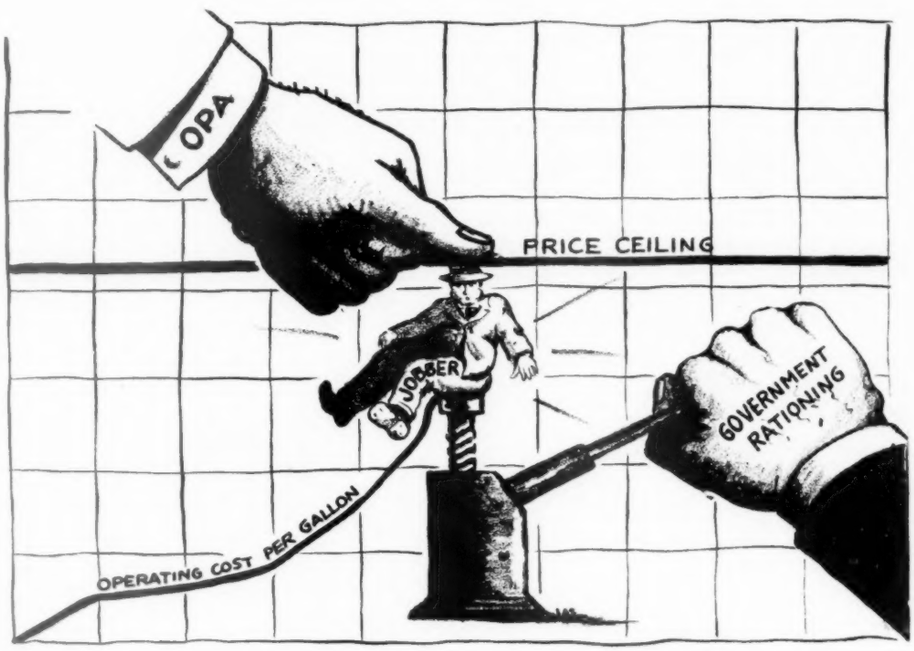
OTTAWA — Canadian gasoline sales for June 1942 fell sharply below the figure for 1941, although the total for the first 6 months of this year does not show so abrupt a drop compared with last year, according to the Department of Trade and Commerce report.

Returns show sales of 82,631,000 gal. for June 1942, and 98,314,000 gal. for June 1941. The January to June figures were 406,916,000 gal. in 1942 against 428,156,000 gal. in 1941.

Consumption of all petroleum fuels except gasoline rose, however. Tractor distillate consumption in the Prairie Provinces in 1942 was 678,135 bbls. compared with 628,134 bbls. in 1941. Light fuel oil (including kerosine, Diesel oils, tractor distillate in the rest of Canada, and all light burning fuel oils) reached 4,671,444 bbls in 1942, against 4,499,734 bbls. in 1941. Heavy fuel oils for 1942 was 9,178,949 bbls. compared with 8,960,919 bbls. in 1941.

War's Impact Bears Heavily On Nation's Oil Jobbers

This is a quick picture of the situation of the oil jobber today. The trend has been developing for some time; it's moving rapidly now. Dr. John W. Frey, special assistant to Deputy Petroleum Coordinator Davies, is presently discussing jobbers' problems at meetings with them in various sections of the country—a recognition of the difficulty of the jobbers' position. At the same time, efforts are being made to uncover concrete facts on the war's effects on jobber operations through the district oil advisory committees—Ed.



The 'Squeeze Play': Very Popular This Fall

By NPN Staff Writer

SYRACUSE—What is the present status of the jobber, and what of his future—if any?

The squeeze is on. The marginal jobber is caught between the refiner's ceiling, which is the jobber's floor, and the retailer's ceiling, which limits the jobber's roof. These ceilings are government prices, fixed by OPA. In this trap, the jobber is being crushed by rising operating costs—labor, taxes, trucking and other expenses pyramided by the war emergency.

Looking further into this three cornered snare, here are additional outstanding difficulties that threaten to stamp out the jobber:

1—Reduced gallonage, by government rationing.

2—Dislocations of population incident to the war; labor attracted to distant war plants by higher wages.

3—Fuel oil rationing coming.

4—Rubber rationing in one form or another.

5—Unpaid obligations incurred before the present war emergency.

When shortages of petroleum products first occurred in the Atlantic Coast area, due to submarine sinkings and diversion of coastwise tankers to military service, the jobber had less products to sell. Shortages mounted, and loosely controlled gasoline rationing by L-70 resulted. Then OPA took over and tightened rationing restrictions with the coupon system, (but still without the desired results) and automobiles were being driven less and less.

Sales to supplying contractors on war plant construction jobs assisted some jobbers in maintaining gallonage volume, which tided them over through summer months; but this construction work is finished or nearing completion and the war plants are ready for use.

Jobber opportunities for serving war implement manufacturing plants in operation are practically nil, for the managements of such plants go direct to the refiner for their petroleum product supplies, which they use in large quantities.

Hit by Population Shifts

Further, numerous such large new plants have caused enormous shifts of population, since such plants are well supplied with government money and pay high wages. This migration to war plant areas has left many jobbers and their retail outlets in vacated districts with materially reduced markets.

In such abandoned areas, and in cities and districts where pleasure driving *was* extensive, or where other forms of transportation are available for business, shopping and pleasure, the jobber and his retailer have been hit the severest blows.

Meeting, or attempting to meet, the competitively higher wages paid by war plants, largely accounts for increased labor cost to jobbers anxious to retain old employes or secure capable new ones.

More fortunate jobbers in new war plant areas affected by the influx of new families say they are "doing all right on a gallonage basis", but they are still—or even more so—affected by pyramiding operating costs.

In addition to the already fully developed shortages of petroleum products for automotive use, the approach of cool fall weather brought to the fore the question of heating oil supplies in the North and East. Refiners were told by government to shift their runs to these fuel supplies.

Although solid tank car trains have greatly accelerated the movement of oil products eastward, the eastern shortages have increased, and the resulting squeeze that is crushing eastern jobbers is rapidly spreading westward. It will further intensify with completion of enlarged and multiple numbers of new war plants, demanding more laborers at high wages and more petroleum products to run them; and with rubber shortages and nationwide rationing of car mileage in one form or another, which means less driving and less oil and gasoline consumption—further decline in gallonage to be sold by the jobber.

Plowed Back Profits

In developing and enlarging their growing businesses during the past several years, many jobbers have plowed back all profits except necessary living expenses, and life savings. All they have is invested in their businesses and in the present emergency they are without reserves. In fact, many have heavy obligations unpaid.

Jobbers generally are highly gratified at the sympathetic understanding OPC has for their problems as expressed in speeches Deputy Petroleum Coordinator Davies and Marketing Director Collier delivered at the National Petroleum Assn. convention in Pittsburgh on Sept. 17. Jobbers were quick to recognize that in so far as OPC is concerned, only unavoidable war conditions and requirements may bring about their partial demise, for Mr. Davies said:

"It is the firm conviction of the OPC that total adjustment of the economy of oil to the demands of war can be accomplished within the framework of the free enterprise system . . . . The impact of the war on the petroleum economy cannot but result in certain casualties in oil ranks. It is beyond the power of the Petroleum Coordinator to prevent this . . . ."

The words "free enterprise system" have a heart-tugging pull with jobbers as they dream of what could be accomplished if left to their own devices as in World War I when government merely stood by to prevent true inflation.

OPA's "meat cleaver" method of wanting

Complimentary Billing for THE STAR

Reproduced here are three advertisements, other than ours, which all appeared about the same time.

All three advertisements feature illustrations of Butler Twin-Tank Safety Transports.

Naturally, we feel quite highly complimented—much like the star performer must feel when he comes to town and finds his name displayed in the headlines and in the current advertisements of merchants.

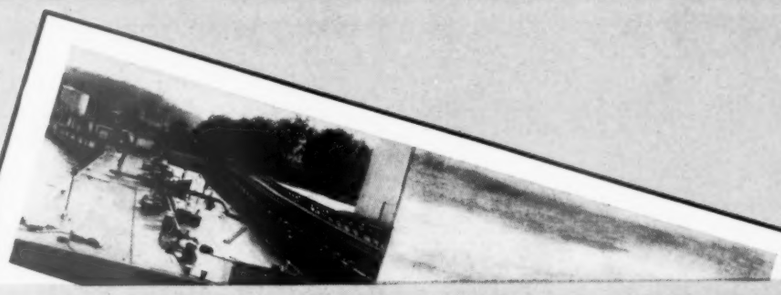
In the field of gasoline transportation, there is no question but that Butler Twin-Tank Safety Transports long have given and continue to give the star performance.

Ask any user of Butler Twin-Tank Safety Transports about the freedom from repairs which they give. He will tell you that "down-time" caused by leaks is virtually a thing of the past. Leak loss, leak danger, cost of repairs, loss of time on the road—these are all out-of-pocket costs which Butler Twin-Tank Safety Transports on Two-Step Springing do away with.

A good stock of 4,000 gallon Butler Twin-Tanks are on hand—can be delivered on presentation of your certificate of Transfer (PD 321 Forms).

He's on his way to sink a sub
K. J. EISENHARDT, PRESIDENT
COASTAL TANK LINES
YORK, PA.
Getting oil where it's needed... when it's needed... that's Coastal Tank Lines' way of shooting bullets.

PERFORMER



A MILLION GALLONS And All Accounted For!

A MONTH

THE NEW marine terminals set up for military and civilian wartime economy operate for the most part on a clockwork precision basis. Metering therefore plays a prominent role. Checks All Products. "Our Red Seal meters give us an accurate check of all products handled," reports Capitol Oil Corporation (Madison, Wis.) whose Dubuque, Iowa, marine terminal here pictured has a monthly throughput of approximately 1,000,000 gallons of gasoline, kerosene and fuel oil. Storage is handled on a temperature basis.

Metered accuracy is invaluable from Capitol's own standpoint — and that of its customers, who "are assured of receiving correct gallons."

Tank Trucks Also Metered. Each truck in the entire Capitol transport fleet is furnished with a Red Seal Print-O-Meter, which provides the customer with a printed ticket showing the exact, metered gallonage delivered. There can be no dispute. Accurate split-compartment deliveries are made possible — and easy.

Entire Output Metered. The Capitol transport trucks load out of the Dubuque terminal for both local and interstate hauls. Red Seal Auto-Stop Meters on the loading rack spread up fills—flow being cut off automatically at predetermined gallonage. Loading by meter not only is faster, it also "recalibrates" each truck tank compartment at every fill.

Overland hauls of Capitol deliveries are made also by tank cars, routed from their railroad siding in the terminal yards. Metered fill of the cars is taken care of by a separate Red Seal loading meter, installed a few rods from the tracks and fill-pipes.

Input Can Be Metered. Barrievals often are metered by marine terminal or bulk plant. An incidental but appreciable saving is made by the air release valve which prevents excess evaporation losses during the scavenging of tank cars and barges.

Metering Controls Losses. Metered control of input, of output at the loading rack, and of tank truck deliveries, will expose any discrepancies between incoming and outgoing stock—and will identify any losses all the way through to the point of final sale and delivery. An accurate, perpetual inventory easily can be maintained. Accounting and sales records are simplified. Exact measurement of deliveries is assured, with reduced spillage and waste. All stock losses are held to a minimum — not a single gallon remains unaccounted for.

Correct Installation and Maintenance. Oil companies have the benefit of recommendations, for the correct installation or checking of field engineers, for the correct installation or checking of a Red Seal meter at any point in the bulk plant or on any truck. Proper installation of the meter, with its required accessories and connections, is essential to maximum efficiency and service.

Complete maintenance instructions — as to periodic cleaning of the strainer screen, etc. — likewise are vitally important, and of course are readily available. (Sure, your Red Seal Service Manual ! Everybody knows that this is no time to neglect maintenance!

By the same token, it is a time when the many advantages offered by your meters should be utilized to the utmost.

NEPTUNE METER COMPANY: Main Office, 50 West 50th Street, New York. Branches at Atlanta, Boston, Chicago, Dallas, Denver, Kansas City (Mo.), Los Angeles, Louisville, Philadelphia, Portland (Ore.), San Francisco, and Long Beach, Ont. (non-Toronto)

NEPTUNE RED SEAL METERS

DISPENSING PUMPS • METERS FOR: BARGE AND TANK CAR UNLOADINGS • STOCK TRANSFERS • LOADING RACKS • DELIVERY TANK TRUCKS

1. Thanks to International Metal Hose Company, Inc. a Butler Twin-Tank is shown "fast-flow fueling" war tanks.

2. K. J. Eisenhardt, President of Coastal Tank Lines, is plenty proud of the job his Butler Twin-Tanks are doing hauling for the Army and Navy Services. Mr. Eisenhardt reports service men and officers comment highly on his Butler equipment. Thanks Mr. Eisenhardt.

3. Thanks to Neptune Red Seal Meters for featuring the metering of gasoline into or out of 4 Butler Twin-Tank Safety Transports.

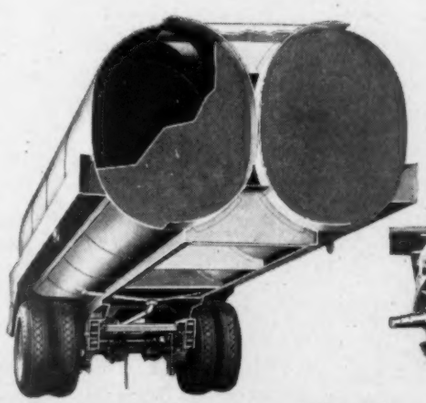
For prompt handling address all inquiries to:

BUTLER MANUFACTURING COMPANY

1241 EASTERN AVE.
KANSAS CITY, MO.

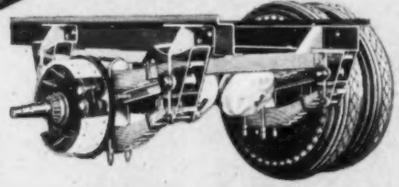
941 SIXTH AVE., S. E.
MINNEAPOLIS, MINN.

Sales Offices — Washington, New York, Chicago, Atlanta, Shreveport and Houston. Representatives in other principal cities.



Butler Twin-Tank construction gives you the only transport with I-beam integral frame deeper than the tank body and a 20 to 1 factor of safety.

Two-Step Springing gives Butler Twin-Tank Safety Transport a soft, floating ride when traveling empty — frees it of road shocks, lengthens its life.



N-TANK *Safety* TRANSPORT

Southeastern Jobbers Petition FDR to Name Single Oil Director

Special to NPN

ASHEVILLE, N. C.—Resolution urging President Roosevelt to appoint a single individual with authority over the oil industry was adopted here during the Sept. 21-22 meeting of southeastern oil jobbers with Dr. John W. Frey, special assistant to Deputy Petroleum Coordinator Davies. The resolution was passed without Dr. Frey's knowledge and was not disclosed until Sept. 28—until it had been received by the President.

Oil men signing the resolution represented oil jobber associations of Virginia, West Virginia, Kentucky, Tennessee, South Carolina and North Carolina.

The resolution asked that the single individual named by the President be "in complete charge of all phases and branches of the petroleum industry" and that he be "given necessary authority to act competently and thereby bring about a systematic control of the industry subject only to the authority of the President."

At the meeting, the oil marketers deplored "the fact that multiplicity of agencies is resulting in confusion in orders and recommendations originating from Washington." They also asked a modification of Conservation Order M-86-c so as to permit use of equipment now at stations which have closed. The meeting was one in a series being held by Dr. Frey with oil jobbers to discuss their problems and listen to their suggestions.

Southeastern oil marketers who attended meeting at Asheville, N. C., Sept. 21-22 with Dr. John W. Frey, special assistant to Deputy Petroleum Coordinator Davies were: FRONT ROW (left to right)—C. L. Thomas, Greenville, S. C., Thomas Oil Co.; O. A. Backhaus, Lexington, Ky., Kentucky Independent Oil Co.; John W. Wright, Charleston, W. Va., Elk Refining Co.; Spencer R. McMaster, Winnsboro, S. C., Winnsboro Petroleum Co.; Dr. Frey; T. Wilbur Thornhill, Charleston, S. C., Charleston Oil Co.; Fred W. Herlihy, Orangeburg, S. C., Power Oil Co.; M. B. Whiting, Clifton Forge, Va., Whiting Oil Co. BACK ROW (left to right)—C. B. Myers, Statesville, N. C., Myers Oil Co.; H. L. Thatcher, Chattanooga, Thatcher Oil Co.; C. Owen Maphis, Harrisonburg, Va., Maphis-Chapman Corp.; C. M. Barringer, Newton, N. C., Superior Petroleum and Fuel Co.; D. C. Tyrrell, Roanoke, Sunoco distributor; W. L. Heinz, Columbia, S. C., Pure distributor; and H. F. Stoke, Roanoke, Va., Roanoke Oil Co. W. A. Parker, Raleigh, N. C., secretary of the North Carolina Oil Jobbers Assn., was not present when this photo was taken

---

to arbitrarily chop off the "socially undesirables" up to 80%—jobbers and dealers whose neckties are not the right color—does more than irritate the jobbers' risibles.

Jobbers are thoroughly patriotic and American, and will accept any condition when it is clearly proven by their own efforts that that condition is the best there is, and that their sacrifice will contribute to winning the war. But jobbers will be satisfied with nothing less. In open competition, each jobber feels that he has a chance, and will eagerly attack a flaming hell with but a single bucket of water. If he is one of those to go down due to his own short comings or the war emergency, he will still be waving Old Glory.

While Mr. Davies and Mr. Collier were speaking in Pittsburgh, jobbers elsewhere were saying, "we must have relief from crushing ceiling prices, or we die!"

Relief Must Come from OPA

The only relief possible—or impossible—at present must come through OPA. Each jobber must prove individually that he is not the unwanted stepchild of an alphabet married to a strange industry. If he can do that he can live—maybe! If he can prove with facts and figures that he is operating on a sub-marginal basis, OPA "might" come into his localized situation and cut a thin slice off somebody else's pie and make his marginal meringue a little thicker. OPA said once that nothing additional comes out of the consumer's pocket; that any wider jobber margin must be cut from beneath.

Jobbers Ready to Fight

But is OPA right? Many jobbers do not think so, and are preparing to "fire the works—in the right way, of course".

And they feel that is just and correct, for the jobber who has served the public direct and through the retailer faithfully and long cannot die—not with his healthy, hulking framework of storage tanks, drums, garages, warehouses and trucks that blankets the nation and enables the war worker to hitch up the old bus each morning and get to work on time; that serves "necessary business" men, who must keep things moving; and farmers with produce to market. Now, with winter ready to whip down out of the frigid north, there are also thousands of homes to keep warm.

No, the jobber can't die with all that work to do—not unless of course, like the old family hoss, "he just lies down and dies".

Every jobber—every man—must fight for every breath he draws today, or in some manner the twirling, spidery Nazi swastika will fan him down and the yellow Jap sun set on him.

But what are jobbers actually doing to keep alive?

Well, at the Empire State Petroleum Assn. meeting here on Sept. 17, jobbers quivered a little under the X-ray spotlight. What some still needed was a hypodermic—or an old fashioned kick in the pants. Ideas were divergent; concrete facts and figures were lacking; the jobbers knew they were being hurt, but many didn't know where. Some were not awake to the prospects of the future—the scraping of "barnacles" from the war machine as OPC's Marketing Director Collier put it when he spoke of eliminating duplicate facilities and multiple operations which waste effort, manpower, equipment and money.

Jobber Action Necessary

Jobbers who do not have the impetus to streamline, and who are not on the alert soon to speak their piece in straightway fact, may find it's too late. Thoughts and needs should be crystallized locally and nationally.

In a diligent search for these things, some interesting questions came out at the E.S.P.A. meeting here.

"I don't mind telling you fellows my sales dropped $1500 in August alone," one said. "We should write to Nelson, Henderson and OPC—press our problems with all of them."

"We ought to decide on one government agency to centralize authority over the oil industry, and stick with it and fight for it."

"Who will it be—OPC or OPA?"

"Henderson will bang on the table and shout 'I'm boss!' "

"Up here, you've got <u>two</u> wars on your hands"

"Up where my battery's located, you not only fight the enemy, you fight the cold.

"It's so cold you figure you ought to be chopping your way through the air instead of walking through it.

"So cold you don't expect any of your mechanical stuff to work the way it should.

"Take the guns, for example. The day I got here, I sure had my fingers crossed the first time they let go. Figured the oil in the recoil cylinders 'd be gummed solid.

"But, by golly, those babies work just as sweet as if it was mid-summer back at the training grounds.

"*Brother, was I thankful!*"

* * *

PETROLEUM CONQUERS THE WEATHER. Conquering the weather—from the blasting heat of the tropics to the sub-zero cold of the Arctic—is one of the tough lubrication problems tackled and solved by the oil industry in its many-sided contribution to America's war effort. For oil, as every motorist knows, tends to thicken up in cold weather, thin out in hot.

Solving this problem is a small—but very vital—part of the big job the American oil industry is doing in producing, transporting, and utilizing this essential war material . . . *petroleum*.

We at Gulf are proud to have a share in this job.

GULF

Gulf Oil Corporation

"Maybe the majors will help us—they have in the past."

"Some of the major companies are in the doghouse themselves, and all are crying about how hard they are hit. OPA says any relief must come out of their pocket—not the consumers—if there is any relief."

"We're not trying to form a union to fight the majors!"

Jobbers do not claim for an instant that they exclusively are affected by increased costs and government ceilings; but they do feel that the majors should be more understanding and helpful because the jobbers have served them well for many years. Jobbers know that adding actual increased costs, such as the difference between present tank car and the old tanker freight rates is not inflation—and the consumer pays for it whether through government subsidy and taxes or simply by adding it to the retail price at the time of sale.

"We've got to have facts and figures to work with OPC."

"Get a C.P.A. to collect them for presentation to official Washington."

"Appoint a three man committee to work things out."

"Better make it five men."

A five man committee was appointed (*see NPN Sept. 23, p. 4*).

But that didn't satisfy everyone.

"We should write our senators and representatives, and bring matters to a head that way."

What One Jobber Did

And the following day, it was learned how thoroughly one Syracuse jobber had done just that. He thought of that idea way back last spring—to be exact, March 26, the beginning date of OPA's Revised Price Schedule 88, which in effect turned the squeeze screw on jobber margins.

He is Earle C. "Ducky" Drake of Drake and Mills Oil Co., who says: "We are relatively small independent distributors of petroleum products, specializing in fuel oils. Roughly, we cover Onondaga county."

Messrs. Drake and Mills are young men, brothers-in-law, and the history of their company dates back to 1871—a substantial local enterprise. The March price increase allowed refiners did not assist Drake & Mills, because they still had the same margin.

So Mr. Drake wrote his congressmen and close personal friends who ought to be in position to help. He got Charles H. Kaletski, Syracuse, his regularly employed public relations counsel, to assist. Mr. Kaletski has been actively interested in the cause of "Little Business" for some years and "knows the ropes" in Washington.

But before going to Washington, Mr. Drake wrote to Mr. Ickes and Mr. Henderson (copies to congressmen and personal friends). One of the latter, Edward A. Foley, general counsel of the Treasury, replied:

"Dear Duck:

I have your letter of April 2, and copy of your very persuasive letter to Leon Henderson.

While this is a little out of my field, I shall be glad to ask Leon about it the next time I see him.

Please give my best to Marian and all the family,

As ever, Ed."

Replies from senators were gracious. The cause worthy. Representatives were grateful for the information and would bring it to the attention of committees.

But the net result was a big goose egg—nothing.

Eventually, however, the letter sent to Mr. Ickes trickled down through the routine of various departments, and brought a formal notice from the Office of Price Executive, Petroleum Section, OPA. Along came copies of rules and regulations for the transaction of such business.

Information that seemed to be needed was put together. Rather than have it appear, however, that the circumstance was limited to one company in the Syracuse market, Mr. Drake called in the other independent heating oil distributors here and invited them to participate.

Briefly, in the written protest, Mr. Drake prayed for relief from regulations set forth in Revised Price Schedule No. 88 relating to Nos. 2 and 3 fuel oils. He outlined the situation in detail. Price advances of .4c per gal. Mar. 26 and additional .2c per gal. Apr. 30, did not affect his marginal contract on a gallonage basis, although the total dollar volume of sales increased. The only other items that increased for the jobber were labor, taxes, transportation and other operating costs, which reduced net income.

"A year ago, Drake and Mills Oil Co. gross profit was almost 29%, and today, just under 19%," Mr. Drake said. "The major oil company today is grossing 1c per gal. more than he was a year ago. We are paying our supplier 1.5c per gal. more. We have grossed all year from .6c to .9c per gal. less."

"The relief we seek," stated the written petition sent Washington, "is an adjustment either in the price ceiling to the consumer (tank wagon price), keeping in effect the present price ceiling to the distributor (tank car price), which will permit the independent distributor to obtain proper compensation for the added costs of doing business, particularly in the light of a shrunken market resulting from restricted supplies; or a directive order to major oil companies, whereby the arbitrarily established tank car price should be so adjusted to give the independent dealers operating in this market a suitable spread.

"Because the small independent dealer has established facilities for the servicing of homes and public or quasi-public buildings, it is our earnest belief that our position should be protected in the administration of price levels. Unless such adjustment can be made, individual enterprisers will be forced to withdraw from the market, thus concentrating control of the business of oil distribution directly in the hands of the major oil companies—a circumstance contrary to the policy of our government."

Once again there was a delay of weeks before word was received that the protest was "dismissed without prejudice".

The next step was to request an appointment with the office of Mr. George W. Doffing.

District 2 Queries Jobbers; Seeks Marketing Cost Data

CHICAGO—A questionnaire seeking comparison between oil marketing costs in July, 1941, and July, 1942, has been sent by the District 2 marketing committee to mid-western jobbers through the state oil jobber associations, NPN has learned. Return of the questionnaires by Oct. 1 is requested, since the problems of the jobber under wartime conditions are to be discussed by the marketing committee at its meeting early in October.

The questionnaire follows:

Jobber Location ..... (City) ..... (State)

Name ..... (Name of Jobber may be omitted)

	July, 1941 (Gallons)	July, 1942 (Gallons)
1. Sales:		
Gasolines and naphthas, including aviation gasoline		
Kerosene, including range oil		
Tractor fuels and diesel fuels		
Burning Oil distillates (No. 1, 2, 3)		
Residual fuels		
Other Petroleum products		
Total Gallonage		
Dollar value of sales of tires, tubes, batteries and automobile accessories		

2. Labor Costs, state increase or decrease (in dollars) for the month of July, 1942, as related to July, 1941

   This item consists of the entire salary payroll, including administrative costs, selling, drivers' salaries and commissions and all other wages paid in performing the wholesale functions. EXCLUDE salaries or commissions paid for service station employees at direct operated retail stations.

3. Occupational Costs, state increase or decrease (in dollars) for the month of July, 1942, as related to July, 1941

   This item consists of the total rentals paid, less the rentals received for office, storage, and distributing facilities are owned outright, state the investment in office building, storage, and distributing facilities (one figure) $ Where they are owned in part, or leased in part, report both the investment and the monthly payment.

4. Transportation Costs, state increase or decrease (in dollars) for the month of July, 1942 as related to July, 1941

   This item should consist of any increase in transportation costs incurred in the movement of products from source of supply to bulk plant.

5. Conversion Costs incurred during 1942, (in dollars)

   This item consists of the cost of converting facilities at bulk-plant to permit receipt of products by transport truck in place of tank car.

6. Miscellaneous Operating Costs, state increase or decrease (in dollars) for the month of July, 1942, as related to July, 1941

   This expense classification should include stock losses, credit losses, goods used, advertising costs, travelling expenses, water, light, fuel, supplies, depreciation, etc.

whose name had appeared on all the correspondence as the Price Executive.

With a date arranged, Mr. Drake and Mr. Kaletski went to Washington to see Mr. Doffing.

"Our reception was most courteous," said Mr. Kaletski. "Mr. Doffing hadn't heard about the case, but he wanted to talk about the fuel oil business with someone who apparently had come prepared to talk facts. He liked that idea.

"The two men in the department, Peter Jensen and W. J. Hull, who had handled the docket, quickly pointed out why the protest had been dismissed. 'Did the order make it impossible for Drake and Mills to continue to function in the service of their customers?' 'Was the consumer going to suffer as a result of the order?' 'Was Syracuse a sub-marginal market?' "

"Questioning was friendly, cooperative, direct, pertinent and important," Mr. Kaletski continued. "There could hardly be any question as to the desire to be helpful. No, they didn't send Mr. Drake back to Syracuse with a promise of a better margin. They didn't even offer any real encouragement; but they did say in effect:

Asks Answers to Questions

" 'Go back to Syracuse and tell your fellow distributors that if it can be shown that you are working in a sub-marginal market, this department will endeavor to help rectify the difficulty. To do this, have all of your companies furnish us with the answers to these questions:

" '1—The over-all annual earnings before and after federal income taxes for each year 1936 to 1941, inclusive.

" '2—Quarterly statements for 1941 and for the first half of 1942.

" '3—Balance sheets for the fiscal years of 1941 and 1942.

" '4—History of the laid down costs of No. 2 and No. 3 fuel oil by months for the years 1940, 1941 and the first half of 1942, showing total cost per gal.

" '5—The history of net price—tank wagon basis—for monthly periods 1940, 1941 and the first half of 1942.

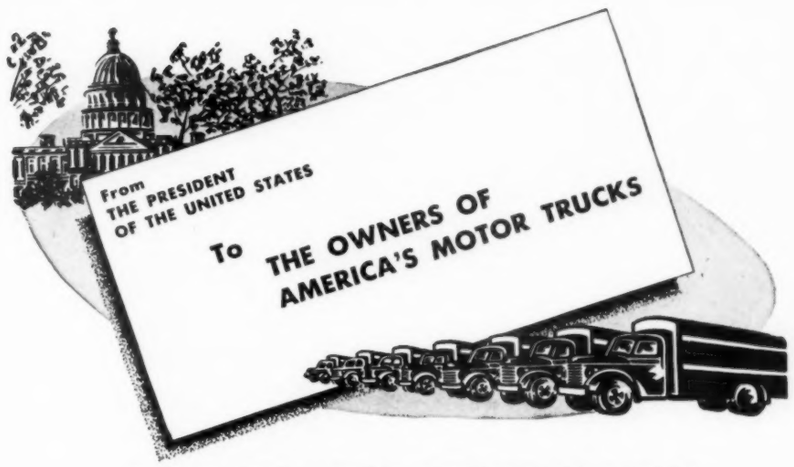
" '6—History by months of volume of sales of No. 2 and 3 fuel oil for 1940, 1941 and 1942.

" '7—Names of all suppliers during period covered by report.' "

On Sept. 14, Mr. Drake received a letter from OPA, acknowledging his withdrawal of the protest, and authorizing him to refile it as a petition for amendment, answering the preceding questions.

Remember, Mr. Drake said above, "I'm a relatively small independent distributor. . . ." which means he has not had through the years and does not yet have an elaborate accounting department to maintain the detail records called for above. Few jobbers do, so—

Just what is the present status of the oil jobber and his future—if any?



ORDER OF THE DAY!

" . . . Motor trucks are now an almost irreplaceable commodity. Many manufacturers must devote their efforts to building military vehicles only. Others must turn from making automotive materials to producing guns, shells, and other equipment needed by our armed forces. Rubber has become precious.

These things mean that it has become the patriotic duty of every truck operator in America to help in every possible way to make his truck and tires last longer."

These paragraphs were written by Franklin D. Roosevelt and addressed to the owners of America's motor trucks. They underline the importance of the preventive maintenance programs launched by the Office of Defense Transportation.

The O.D.T. has asked all truck owners to sign a personal pledge —as an assurance to the American public—that they will do everything possible to maintain their trucks at peak efficiency.

Today, the trucking facilities are, in a real sense, the lifeline of American industry . . . the transmission belt that delivers the goods to factories and warehouses. *That life-line must be kept intact.*

We, of Cities Service, are glad to get behind the program of the O.D.T. with all the facilities we have. Equipped with such exclusive developments as the Power Prover, Sealed Lubrication, the Ride Improver and other special features, Cities Service is in a unique position to keep the Nation's trucks well-serviced and rolling on the job.

Today, as always, the ideal of Cities Service remains the same. *Service to the Nation!*

Many Cities Service dealers have signed the O.D.T. pledge and are qualified to render protective maintenance service to America's vital transport fleets.

OIL IS AMMUNITION — USE IT WISELY!

CITIES SERVICE OILS
ONCE-ALWAYS

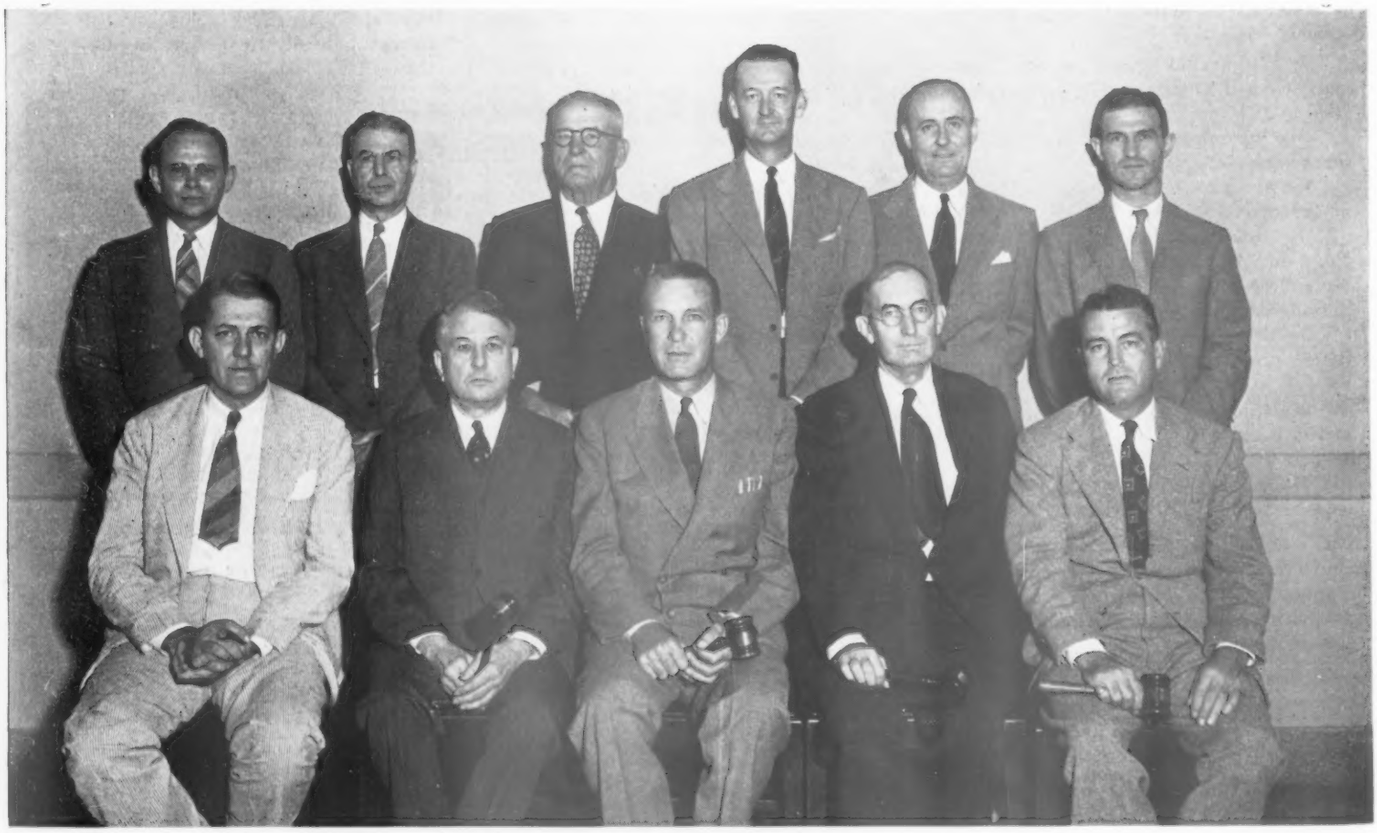
CITIES SERVICE
OIL COMPANIES

NEW YORK — CHICAGO — SHREVEPORT

A.P.I.C. Marks 10th Anniversary

This is the second group in NPN's picture series on state committees of the American Petroleum Industries Committee, which is 10 years old this year. Shown here are the state committees for Kansas, Colorado and Alabama. See NPN Sept. 9, p. 32, for initial story.

Members of the executive committee of the Kansas Petroleum Industries Committee are: STANDING, LEFT TO RIGHT—H. Y. Robertson, Texaco; William Ainsworth, producer; D. C. Fleming, Skelly; J. W. Ross, Standard. SEATED, LEFT TO RIGHT—E. H. Lyons, Phillips Petroleum Co.; C. L. Henderson, Vickers Petroleum Co.; C. E. Holmes, secretary. MEMBERS NOT PRESENT: Walter E. Brown, chairman, Sinclair; A. C. Carpenter, Lesh Oil Co.; T. A. Helling, Eldorado Refining Co.; H. K. Phipps, White Eagle Pipe Line Co.

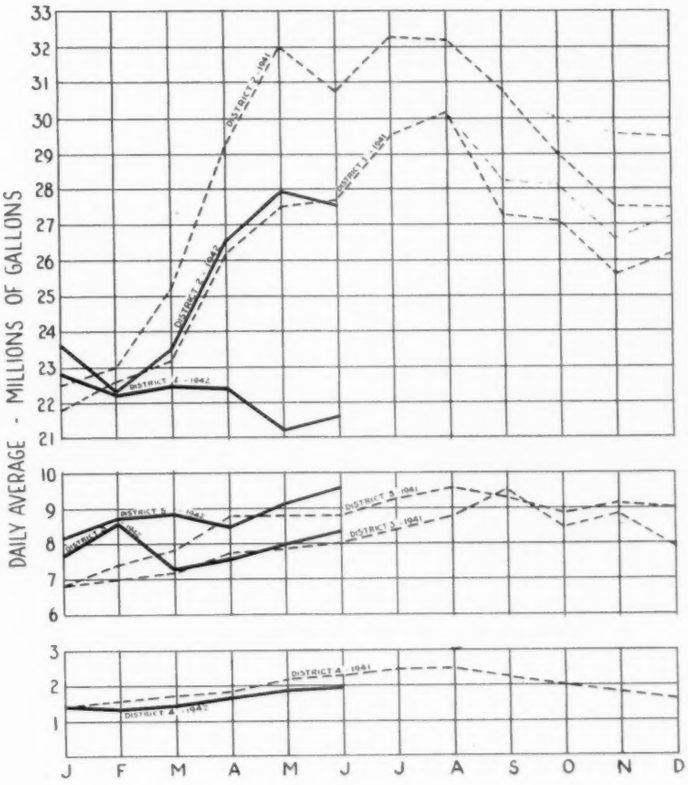


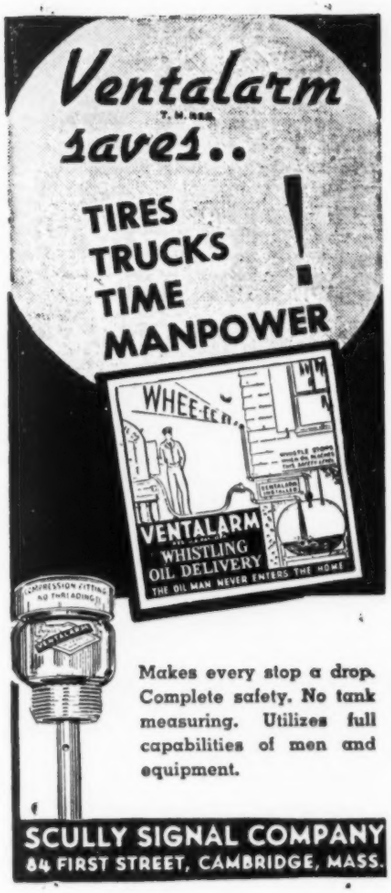
Members of the executive committee of the Alabama Petroleum Industries Committee are: FRONT ROW, LEFT TO RIGHT—J. B. Kelley, Gulf, vice-chairman; D. H. Bohler, retired from Standard Oil Co., past chairman and honorary member, L. H. Anderson, Texaco; D. L. Gilland, Wofford Oil Co.; C. J. Hans, Sinclair. BACK ROW, LEFT TO RIGHT— E. M. Hearne, secretary; L. S. Williams, Kentucky Standard; Maj. D. A. Vann, retired from Sherrill Oil Co., honorary member; S. G. Fallaw, Sloss Special-Benzol Co.; J. B. Turner, Arkansas Fuel Oil Co., chairman; S. A. Gervin, Shell. MEMBERS NOT PRESENT: W. B. Britton, Interstate Oil Co.; J. McCrory, Pan American; F. W. Sherrill, Sherrill Oil Co.

June 'Gas' Consumption Off 10.4%—A.P.I.

NEW YORK—June gasoline consumption fell 10.40% in 46 states and the District of Columbia, according to American Petroleum Institute report. Figures for June 1942 total 1,949,998,000 gal. compared with 2,176,443,000 gal. in June 1941.

Consumption for District 1, most of which is rationed, was off 21.83% compared with last year. Vermont showed the largest decrease—35.31%.





Makes every stop a drop. Complete safety. No tank measuring. Utilizes full capabilities of men and equipment.

SCULLY SIGNAL COMPANY
84 FIRST STREET, CAMBRIDGE, MASS.

JANUARY

District Number	1941 Totals	1941 Daily Average	1942 Totals	1942 Daily Average	% Change Over 1941
1	676,176,000	21,812,129	711,681,000	22,957,453	+ 5.25
2	700,073,000	22,583,000	733,679,000	23,667,060	+ 4.80
3	213,966,000	6,902,129	239,640,000	7,760,828	+12.00
4	43,664,000	1,408,517	43,578,000	1,405,740	— 0.20
5	212,923,000	6,868,483	252,314,000	8,139,160	+18.50
	1,846,802,000	59,574,258	1,980,892,000	63,899,736	+ 7.26

FEBRUARY

1	637,072,000	22,752,570	623,538,000	22,269,214	— 2.13
2	645,271,000	23,045,392	622,887,000	22,228,107	— 3.55
3	195,438,000	6,979,931	211,951,000	7,569,679	+ 8.45
4	42,341,000	1,512,178	37,229,000	1,329,607	—12.07
5	208,513,000	7,446,892	243,471,000	8,695,393	+16.77
	1,728,635,000	61,736,963	1,738,576,000	62,092,000	+ 0.58

MARCH

1	718,216,000	23,168,253	700,494,000	22,596,575	— 2.47
2	781,448,000	25,208,000	729,102,000	23,519,425	— 6.70
3	221,721,000	7,152,290	224,478,000	7,241,226	+ 1.24
4	53,495,000	1,725,645	46,252,000	1,491,997	—13.54
5	242,607,000	7,826,023	277,364,000	8,947,230	14.33
	2,017,487,000	65,080,221	1,977,690,000	63,796,453	— 1.97

APRIL

1	785,799,000	26,193,000	673,514,000	22,450,467	—14.29
2	878,385,000	29,279,500	805,631,000	26,854,367	— 8.28
3	231,268,000	7,708,933	226,778,000	7,559,266	— 1.94
4	57,492,000	1,916,400	54,877,000	1,829,233	— 4.55
5	264,990,000	8,833,000	254,077,000	8,469,233	— 4.12
	2,217,934,400	73,931,133	2,014,877,000	67,162,567	— 9.16

MAY

1	855,423,000	27,594,290	657,496,000	21,209,548	—23.14
2	992,067,000	32,002,162	847,627,000	27,342,806	—14.56
3	244,629,000	7,891,258	246,107,000	7,938,935	+ 0.60
4	66,292,000	2,138,452	58,018,000	1,871,548	—12.48
5	271,953,000	8,772,677	282,397,000	9,109,581	3.84
	2,430,364,000	78,398,839	2,091,645,000	67,472,418	—13.94

JUNE

1	829,450,000	27,648,333	648,408,000	21,613,600	—21.83
2	924,110,000	30,803,667	828,033,000	27,601,000	—10.40
3	240,675,000	8,022,500	249,199,000	8,306,634	+ 3.54
4	67,875,000	2,262,500	58,110,000	1,937,000	—14.39
5	263,168,000	8,772,267	288,748,000	9,624,933	+ 9.72
	2,325,278,000	77,509,267	2,072,498,000	69,083,267	—10.87

Oil Fuels and Burners

By James A. Moyer

375 pages, 240 illustrations. $4.00

The recent large development in oil burners, especially of the automatic type intended for the heating of residences and apartment houses, calls or understanding of equipment, its 'why' as well as its 'how'; methods of design; data on combustion, heat requirements, etc. The present volume provides this information in a comprehensive way.

Answers your question on:

—oil fuels, production, combustion, ignition, calculation of comparative costs, tests, etc.

—oil-burning systems, in whole and in part, oil supply, atomizers, burners, boilers, automatic control devices

—heat measurements, calculation of new heating systems, also of oil-burners applied to existing systems

—insulation of walls and roofs, in new and old buildings, estimation of savings, etc.

—fans and blowers; drafts and chimneys

—air-conditioning tests

—charts and diagrams for layout of oil-burner systems

—trouble charts of motors and generators

MAIL THE COUPON TODAY

National Petroleum News.
1213 W. Third St., Cleveland, O.
I enclose $4.00 for which please send me the book *Oil Fuels and Burners* by Moyer.

Name.....

Address.....

City and State.....

Birtank Pressure Roofs

BIRTANKS—for Gasoline or Oil Storage

REALIZING the great saving to be effected by the storage of volatile oil products under pressure, the Standard Oil Company of Kentucky has used tanks designed for this purpose exclusively at eight of their terminals on the great Plantation Pipe Line system, one of which is shown above.

These tanks range in capacity from 10,000 barrels to 35,000 barrels. The Terminal handles kerosene, tractor fuel, burner oil and three grades of gasoline. While the tanks are of conventional appearance, they are unique in that THEY ARE DESIGNED TO OPERATE AT 1 LB. PRESSURE. Tremendous savings in evaporation losses are thereby realized, when compared with other forms of construction, which of necessity operate at lower pressures.

The Birtank pressure tank is the answer to your evaporation loss problems. For further information on this special form of construction, consult the Birmingham Tank Company, Birmingham, Alabama.

BIRMINGHAM TANK COMPANY

BIRMINGHAM—PITTSBURGH—NEW YORK—NEW ORLEANS—ATLANTA

Fabricators and Erectors of Tanks and General Plate Work — Structural Steel — Shipbuilding

COMING MEETINGS

OCTOBER

American Gas Assn., Annual Meeting, LaSalle Hotel, Chicago, Ill., Mon.-Tues., Oct. 5-6.

29th National Foreign Trade Convention, Hotel Statler, Boston, Mass., Wed.-Fri., Oct. 7-9.

Texas Mid-Continent Oil & Gas Assn., 23rd Annual Meeting, Dallas, Tex., Thurs.-Sat., Oct. 8-10.

Western Petroleum Refiners Assn., Allis Hotel, Wichita, Kans., Fri., Oct. 9.

American Society of Mechanical Engineers, Fall Meeting, Rochester, N. Y., Mon.-Wed., Oct. 12-14.

Oil Burner Institute, Semi-Annual Meeting, New York, N. Y., Tues., Oct. 13.

Indiana Independent Petroleum Assn., Hotel Severin, Indianapolis, Ind., Wed.-Thurs., Oct. 14-15.

American Institute of Mining & Metallurgical Engineers, Petroleum Division, Hotel Ambassador, Los Angeles, Calif., Thurs.-Fri., Oct. 15-16.

North American Gasoline Tax Conference, Houston, Tex., Thurs.-Sat., Oct. 15-17.

National Stripper Well Assn., Annual Meeting, Wichita, Kans., Mon., Oct. 19.

Independent Petroleum Assn. of America, 13th Annual Meeting, Lassen Hotel, Wichita, Kans., Mon.-Wed., Oct. 19-21.

National Tax Conference, Netherlands Plaza Hotel, Cincinnati, Ohio, Mon.-Thurs., Oct. 19-22.

Ohio Petroleum Marketers Assn., Annual Convention and Marketing Exposition Hotel Deshler-Wallick, Columbus, Ohio, Tues.-Wed., Oct. 20-21.

Society of Automotive Engineers, Midwest Fuels & Lubricants Regional Meeting, Tulsa, Okla., Thurs.-Fri., Oct. 22-23.

National Lubricating Grease Institute, 10th Annual Meeting, New Orleans, La., Sun.-Thurs., Oct. 25-29.

National Assn. of Credit Men, Petroleum Div., Coronado Hotel, St. Louis, Mo., Mon.-Wed., Oct. 26-28.

31st National Safety Congress and Exposition, Sherman Hotel, Chicago, Ill., Tues.-Thurs., Oct. 27-29.

Oil Trades Assn. of New York, Annual Banquet, Waldorf-Astoria Hotel, New York, N. Y., Wed. Oct. 28.

American Institute of Mining & Metallurgical Engineers, Petroleum Division, Austin, Tex., Thurs.-Sat., Oct. 29-31.

Western Petroleum Refiners Assn., Washington-Youree Hotel, Shreveport, La., Fri., Oct. 30.

NOVEMBER

American Assn. of Petroleum Geologists, Los Angeles, Calif., Thurs.-Fri., Nov. 5-6.

California Natural Gasoline Assn., Los Angeles, Calif., Fri., Nov. 6.

American Petroleum Institute, 23rd Annual Meeting, Palmer House, Chicago, Ill., Mon.-Fri., Nov. 9-13.

American Institute of Chemical Engineers, 35th Annual Meeting, Netherlands Plaza, Cincinnati, O., Mon.-Wed., Nov. 16-18.

American Chemical Society, National Chemical Exposition and National Industrial Chemical Conference, Sherman Hotel, Chicago, Ill., Tues.-Sun., Nov. 24-29.

American Society of Mechanical Engineers, Annual Meeting, New York, N. Y., Mon.-Fri., Nov. 30-Dec. 4.

15th National Exposition of Power and Mechanical Engineering, Madison Square Garden, New York, N. Y., Mon.-Fri., Nov. 30-Dec. 4.

DECEMBER

New Mexico Oil & Gas Assn., Artesia Hotel, Artesia, N. M., Wed., Dec. 2.

New Jersey Oil Trade Assn., Annual Banquet & Election of Officers, Robert Treat Hotel, Newark, N. J., Thurs., Dec. 3.

JANUARY, 1943

North Carolina Oil Jobbers Assn., Hotel Carolina, Raleigh, N. C., Wed., Jan. 20.

FEBRUARY

American Institute of Mining & Metallurgical Engineers, Annual Meeting, New York, N. Y., Mon.-Thurs., Feb. 15-18.

Iowa Independent Oil Jobbers' Assn., Hotel Fort Des Moines, Des Moines, Ia., Wed.-Fri., Feb. 24-26.

APRIL

American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pa., April 8-9.

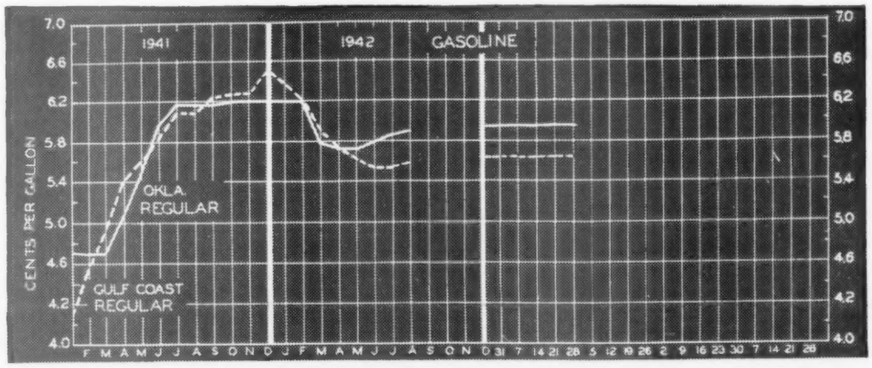
MAY

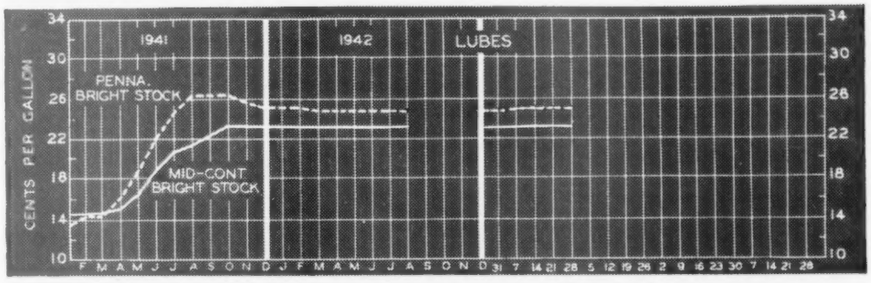
Petroleum Industry Electrical Assn., Houston, Tex., Wed.-Thurs., May 5-6.

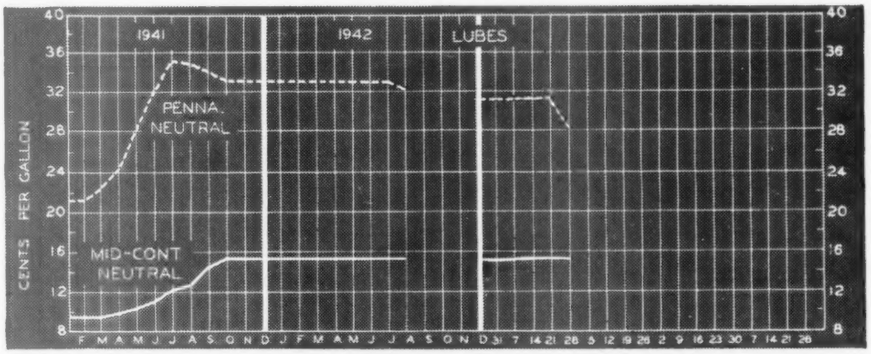
STATISTICS

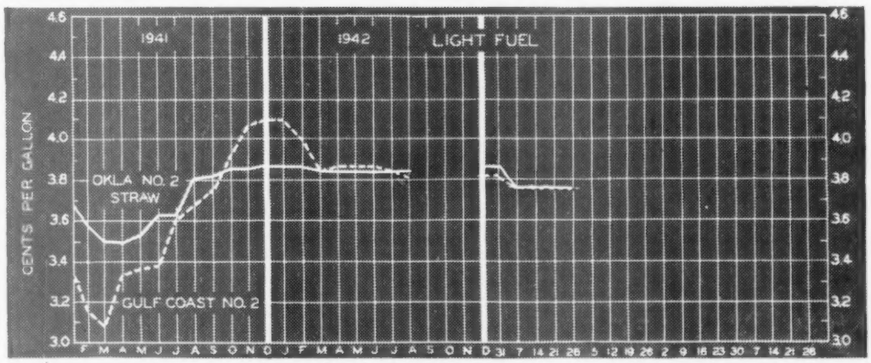
Refinery Prices

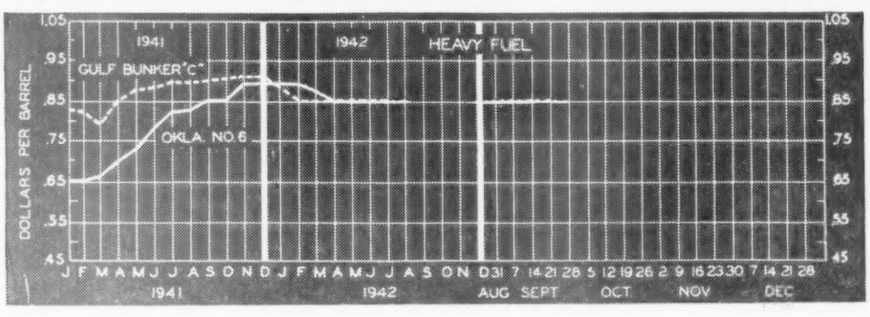
Monthly prices in graphs are averages of daily high and low prices shown in Platt's Oilgram
Weekly prices are averages of high and low prices shown in Monday Oilgram, and in NPN











Production of Natural Gasoline & Allied Products

(Bureau of Mines figures in thousands of barrels)

	July 1942	June 1942
Pennsylvania	18	18
West Virginia	159	157
Ohio	7	8
Illinois	275	265
Kentucky	60	62
Michigan	6	6
Kansas	133	126
Oklahoma	878	868
Texas	3,062	2,968
Arkansas	88	85
Louisiana	588	567
New Mexico	180	163
Colorado	2	1
Montana	6	9
Wyoming	69	65
California	1,272	1,190
Total	6,804	6,558
Daily Average	219.5	218.6

Pacific Coast Taxable Gasoline Sales

(Reported by California Oil & Gas Assn., figures in gallons)

	July 1942	July 1941	% of Change
Arizona	10,040,438	11,022,468	— 8.91
California	164,007,744	191,377,456	—14.30
Nevada	4,150,331	5,028,622	—17.47
Oregon	24,751,190	30,302,040	—18.32
Washington	34,648,283	41,065,357	—15.63
Total 5 States	237,597,986	278,795,943	—14.78

	7 Months Total (January—July) 1942	1941	% of Change
Arizona	68,433,919	71,755,034	— 4.63
California	1,120,510,073	1,198,909,352	— 6.54
Nevada	25,726,220	23,895,554	— 7.66
Oregon	151,998,261	164,825,491	— 7.78
Washington	216,445,317	231,785,906	— 6.62
Total 5 States	1,583,113,790	1,691,171,337	— 6.39

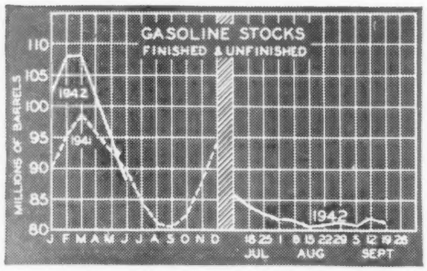
Pennsylvania Crude Runs

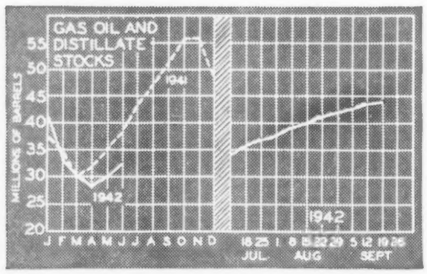
(Compiled by National Petroleum Assn. from reports of all companies which refined Pennsylvania crude. Figures in barrels.)

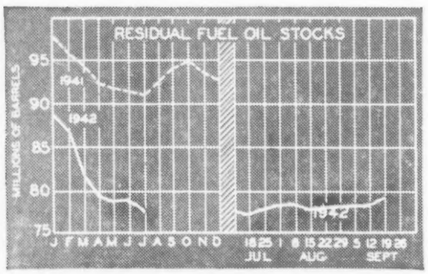
Week Ended	Daily Average	Week Ended	Daily Average
Jan. 3	72,172	May 23	85,563
Jan. 10	77,676	May 30	80,046
Jan. 17	81,658	June 6	83,996
Jan. 24	84,089	June 13	83,808
Jan. 31	82,603	June 20	83,648
Feb. 7	74,927	June 27	80,837
Feb. 14	77,436	July 4	77,973
Feb. 21	82,682	July 11	83,919
Feb. 28	84,173	July 18	84,892
Mar. 7	80,131	July 25	67,243
Mar. 14	76,862	Aug. 1	77,757
Mar. 21	79,510	Aug. 8	72,336
Mar. 28	84,185	Aug. 15	83,256
Apr. 4	78,175	Aug. 22	84,391
Apr. 11	82,557	Aug. 29	77,625
Apr. 18	82,067	Sept. 5	72,721
Apr. 25	19,353	Sept. 12	84,774
May 2	80,399	Sept. 19	84,320
May 9	80,761	1941 Low	61,384
May 16	86,551	1941 High	84,326

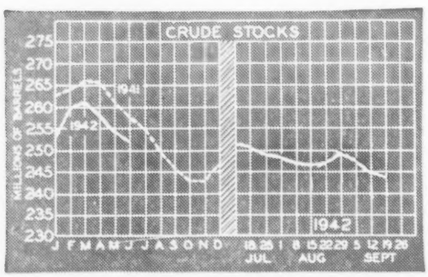
STATISTICS

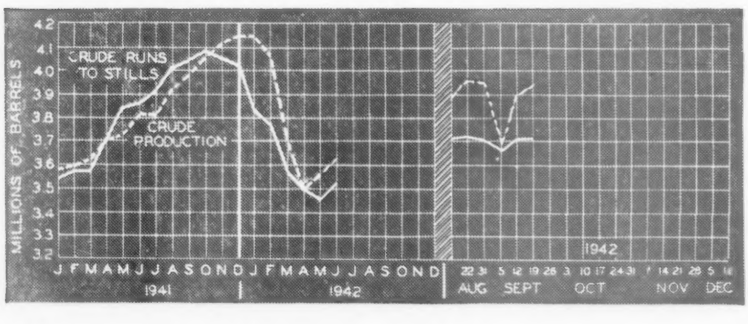
Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.


GASOLINE STOCKS
FINISHED & UNFINISHED
MILLIONS OF BARRELS
1942
1941
1942
J F M A M J J A S O N D
18 25 1 8 15 22 29 5 12 19 26
JUL AUG SEPT








CRUDE RUNS TO STILLS
CRUDE PRODUCTION
MILLIONS OF BARRELS
1942
J F M A M J J A S O N D J F M A M J J A S O N D
1941
1942
AUG SEPT OCT NOV DEC

Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

Districts	Daily Potential Refining Capacity Week Ended Sept. 19	Daily Potential Refining Capacity Week Ended Sept. 12	Per Cent of Refining Capacity Reporting Week Ended Sept. 19	Per Cent of Refining Capacity Reporting Week Ended Sept. 12	Daily Average Crude Runs to Stills Week Ended Sept. 19	Daily Average Crude Runs to Stills Week Ended Sept. 12	Per Cent of Reporting Capacity Operated Week Ended Sept. 19	Per Cent of Reporting Capacity Operated Week Ended Sept. 12
Combined‡	2,440	2,440	88.2	88.2	1,591	1,579	65.2	64.7
Appalachian	176	176	84.8	84.8	172	165	97.7	93.8
Ind., Ill., Ky.	804	804	83.3	83.3	779	765	96.9	95.1
Okla., Kans., Mo.	416	416	80.1	80.1	366	373	88.0	89.7
Rocky Mt.	147	147	48.0	48.0	106	104	72.1	70.7
California	817	817	89.9	89.9	699	724	85.6	88.6
TOTAL U. S.—B. of M. Basis	4,800	4,800	85.6	85.6	3,713	3,710	77.4	77.3
U. S.—B. of M. Basis Sept. 20, 1941					4,047			

Districts	Gasoline Production at Refineries inc. Natural Blended Week Ended Sept. 19	Gasoline Production at Refineries inc. Natural Blended Week Ended Sept. 12	Stocks of Finished and Unfinished Gasoline Week Ended Sept. 19	Stocks of Finished and Unfinished Gasoline Week Ended Sept. 12	Total Stocks Gas Oil & Distillates Week Ended Sept. 19	Total Stocks Gas Oil & Distillates Week Ended Sept. 12	Total Stocks Residual Fuel Oil Week Ended Sept. 19	Total Stocks Residual Fuel Oil Week Ended Sept. 12
Combined‡	4,627	4,728	38,640	39,415	22,948	22,235	18,731	18,811
Appalachian	482	452	2,928	2,876	678	634	523	471
Ind., Ill., Ky.	2,596	2,645	14,200	14,435	6,050	6,107	3,522	3,362
Okla., Kans., Mo.	1,282	1,275	6,759	6,931	1,884	1,844	1,353	1,383
Rocky Mt.	322	304	1,805	1,857	464	454	566	567
California	1,788	1,851	16,461	16,244	12,408	12,293	54,640	54,039
Total U. S.—B. of M. Basis	11,097	11,255	80,793°	81,758°°	44,442	43,567	79,335	78,633
U. S.—B. of M. Basis Sept. 20, 1941	14,236		79,195		50,595		93,919	

°Finished 72,346,000 bbls; unfinished 8,447,000 bbls.
°°Finished 73,127,000 bbls; unfinished 8,631,000 bbls.
‡Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts.

Crude Oil Stocks

(Bureau of Mines figures in thousands of barrels)

	Sept. 12	Sept. 19	Change
Pennsylvania Grade	3,258	3,213	— 45
Other Appalachian	1,282	1,349	+ 67
Lima-Michigan	1,758	1,725	— 33
Illinois-Indiana	11,082	10,753	—329
Arkansas	2,686	2,775	+ 89
Kansas	7,291	7,181	—110
Louisiana:	13,108	13,147	+ 39
Northern	4,268	4,129	—139
Gulf Coast	8,840	9,018	+178
Mississippi	1,445	1,600	+155
New Mexico	5,748	5,664	— 84
Oklahoma	44,632	44,209	—423
Texas:	101,534	101,995	+461
East Texas	24,786	24,204	—582
West Texas	24,803	24,708	— 95
Gulf Texas	27,970	28,476	+506
Other Texas	23,975	24,607	+632
Panhandle	4,559	4,703	+144
North	7,137	7,278	+141
South	4,472	4,521	+ 49
Other	7,807	8,105	+298
Rocky Mountain	15,225	15,203	— 22
California	35,267	35,136	—131
Foreign	355	344	— 11
Total U. S. refinable	244,671	244,294	—377
Heavy in California	10,428	10,589	+161

N.P.N. Gasoline Index

	Dealer T.W. Cents Per Gallon	Tank Car Cents Per Gallon
Sept. 28	10.47	6.66
Month ago	10.47	6.68
Year ago	10.04	6.78

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

Mid-Continent Lube Statistics Aug. 1942

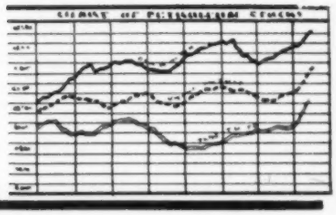
Production	170,322	207,137	57,065	15,151	252,223
Shipments:					
Domestic	138,747	174,839	60,350	22,135	202,252
Export	17,713	4,045	50	343	45,853
Total	156,460	178,884	60,400	22,478	248,105
Inventory, Aug. 31, '42	381,741	402,894	84,483	58,156	182,690
Inventory, July 31, '42	367,879	374,641	87,818	65,483	178,572
Inventory, Aug. 31, '41	192,982	249,807	57,038	35,002	106,037

Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Sept. 19 Barrels (Daily Average)	WEEK ENDED Sept. 12 Barrels (Daily Average)		WEEK ENDED Sept. 19 Barrels (Daily Average)	WEEK ENDED Sept. 12 Barrels (Daily Average)
Oklahoma	376,000	370,200	Eastern (Ill. & Ind. excluded)	97,400	95,200
Kansas	301,000	272,650	Michigan	62,900	65,800
Nebraska	3,300	3,450	Wyoming	94,650	86,900
Texas	1,378,250	1,355,900	Montana	21,700	21,700
Louisiana	340,300	337,550	Colorado	7,000	7,450
Arkansas	73,350	72,500	N. Mexico	97,650	97,650
Mississippi	73,500	73,350	California	738,600	748,700
Illinois	253,400	276,000			
Indiana	16,750	17,450	Total U. S.	3,935,750	3,902,450

Oil MARKETS



Atlantic Coast

NEW YORK, Sept. 28.—Active call for heating oils was reported by suppliers along the Atlantic seaboard the past week who said generally that they were trying to hold jobbers down in the amounts of their takings. Jobbers were trying to get all they could for their own and customers' storage before Oct. 1 when rationing provisions become effective, they said.

Suppliers' problem was in spreading supplies as best they could, keeping enough material on hand to take care of all customers and not giving it all to a few.

Volume of heavy fuel deliveries was constant with suppliers still able to meet heavy demand and shipping all available material to industrial consumers at present. Little interest in gasoline was evidenced, with demand light as a result of sharply reduced gallonage. Quotations at all points were unchanged.

Pennsylvania

NEW YORK, Sept. 26—Neutral oils were priced lower in Western Penna. the week ended Sept. 26 when all refiners lowered their quotations 2 to 5c to 28c and 26c, respectively, for 200 vis. and 150 vis., 25 p. t. grades. Persistent rumors that 200 vis. was being offered at 26c to jobbers and compounders could not be confirmed.

New prices were made effective on domestic neutrals following reductions in quotations to Government on blended oils the week before, it was said. Previous prices for blended oils made Penna. refiners "non-competitive" on Government bids, one refiner said, and with blended oil quotations lowered, there was no point in holding domestic prices for straight neutral at higher levels.

Other products continued tight. "Demand is too good for everything," one refiner said. No increase in activity on kerosine and light fuel reported as a result of announced rationing program on heating oil since business has been at capacity right along, refiners said.

Gasoline also continued scarce. One refiner said he was booked ahead several months with major companies buying for local distribution.

Gulf

NEW YORK, Sept. 26—Buyer interest at the Gulf centered on heating oils the past week, according to refiners' reports, but transportation shortages continued to hamper sales. "Everything is heating oil; no gasoline inquiries to speak of," one refiner said, adding that inquiry for No. 2 fuel and kerosine had picked up steadily during the past month. Another reported inquiries for "substantial quantities" of No. 2 fuel and kerosine but said he couldn't move material against them without tank cars.

Several refiners said they were experiencing storage difficulty because of inability to move material quickly enough. One said he shut down his plant during the week until he can arrange for more transportation to prevent stocks from backing up.

Mid-Continent

TULSA, Sept. 26—Sustained heavy demand for most refined products, firm prices, no surplus stocks, and "only the usual" difficulty in shipping material characterized mid-continent markets the past week, according to most refiners.

Burning oil demand showed steady increase with no limit in sight, most refiners agreed. Imminence of rationing has made customers conscious of future needs and refiners are "snowed under" with orders, many said.

Anticipated seasonal let-up in gasoline demand has not appeared, reports indicated. A few refiners said inquiries slowed up a little, especially for third grade, but "we're still selling all we make", most agree. Agreements with eastern customers for assistance in disposing of gasoline if surplus stocks develop as condition for supplying burning oils was mentioned by some refiners.

Difficulty in getting crude for refinery runs in some areas continues to aggravate problem of low supplies. "The crude situation looks serious," Kansas refiner said. Transportation situation apparently stabilized, with cars still scarce; but "we have enough cars for the material we have to ship", several refiners said.

Mid-Western

CHICAGO, Sept. 26—Large government purchases, brisk eastern trade and heavy shipments under OPC permits to the agricultural Northwest combined to keep the gasoline demand strong this week, according to Mid-West refiners and marketers here today. Low inventories were reported.

Cooler weather and anticipated rationing caused a "terrific rush" in call for burning oils, suppliers said, and daily sales were at "new all-time peak". Shipments were delayed by scarcity of material and tank cars.

Voluntary curtailment in use of cars and reduced driving speeds are responsible for gradually declining sales of automotive lubes, mid-western refiners and marketers declared. However, the demand for industrial lubes is improving and shows steady monthly increase.

Price quotations unchanged.

California

LOS ANGELES, Sept. 26—All prices remained unchanged although gasoline market continued weak with the three grades available at 4.5c, 5.5c and 6c, FOB refinery.

Fuel oils still in good demand with refiners hopeful that OPA will raise ceiling on heavy fuel.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Nov. 21, '41—Maximum prices for paraffin wax	Nov. 26, pg. 5	Nov. 21, pg. 1	Pg. 66
Jan. 17, '42—OPA letter restating contents of letters of Nov. 7, 10 and 28, '41	Jan. 21, pg. 7	Jan. 19, pg. 1	Pg. 135
Jan. 28, '42—Amendment No. 1 to paraffin wax price schedule	Feb. 11, pg. 20	Jan. 29, pg. 1	Pg. 153
Feb. 2, '42—OPA Price Schedule No. 88	Feb. 11, pg. 17	Feb. 4, pg. 1	Pg. 159
Feb. 5, '42—Amendment No. 1 to OPA Price Schedule No. 88	Feb. 11, pg. 18	Feb. 9, pg. 1	Pg. 167
Feb. 7, '42—Amendment No. 2 to OPA Price Schedule No. 88	Feb. 11, pg. 18	Feb. 9, pg. 1	Pg. 167
Amendment No. 1 to Revised Price Schedule No. 88 (Combined form of Schedule 88 and its 4 previously issued amendments)	Mar. 11, pg. 15	Mar. 7, pg. 1	Pg. 205
Mar. 25, '42 — Maximum prices for Penna. grade crude	Apr. 1, pg. 19	Mar. 23, pg. 1	Pg. 237
Mar. 26, '42—Maximum s.s. prices for regular-grade gasoline in East Coast & Pacific Northwest	Apr. 1, pg. 11	Mar. 25, pg. 4	Pg. 243
Mar. 26, '42—Approval of 0.5c advance in gasoline, Atlantic Coast states	Apr. 1, pg. 10	Mar. 25, pg. 4	Pg. 241
Mar. 26, '42—Approval of 0.4c advance in kerosine and light fuels, Atlantic Coast states	Apr. 1, pg. 10	Mar. 25, pg. 4	Pg. 241
Mar. 26, '42—Maximum prices for Bunker "C" & No. 6 fuel, East & Gulf Coasts	Apr. 1, pg. 11	Mar. 25, pg. 4	Pg. 242
Apr. 4, '42—Minimum 3c margin for operators in Curtailment Area	Apr. 8, pg. 3	Apr. 7, pg. 2	Pg. 271
Apr. 4, '42—Prices for crude from wells opened since Oct. 1, 1941	Apr. 8, pg. 5	Apr. 6, pg. 1	Pg. 273
Apr. 18, '42—Price advance for Ritchie, La. crude	Apr. 22, pg. 10	Apr. 20, pg. 2	Pg. 309
Apr. 27, '42—Tank wagon prices: Arkansas, Montana, New Mexico, Oklahoma, Wyoming	May 13, pg. 7	Apr. 29, pg. 1	Pg. 353
Apr. 28, '42—East Coast advance effective Apr. 30	Apr. 29, pg. 3	Apr. 29, pg. 1	Pg. 355
Apr. 28, '42—Maximum service station prices	May 6, pg. 12	Apr. 29, pg.	Pg. 358
May 12, '42—Maximum prices Pacific Coast area	May 20, pg. 7	May 14, pg. 2	Pg. 402
May 26, '42—Discounts frozen at Oct. 1-15, '41 levels	June 3, pg. 9	May 27, pg. 1	Pg. 439
June 27, '42—East Coast advance effective June 29	July 1, pg. 3	June 27, pg. 1	Pg. 534
July 29, '42—Basing "ceiling" prices on published Group 3 quotations	Aug. 26, pg. 3	Aug. 26, pg. 4	Pg. 714
Aug. 3, '42—East Coast decrease effective Aug. 5	Aug. 1, pg. 1	Aug. 5, pg. 3	Pg. 649

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum News are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices), or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (Sept. 22 to Sept. 28)

	Monday Sept. 26	Friday Sept. 25	Thursday Sept. 24	Wednesday Sept. 23	Tuesday Sept. 22
U. S. Motor, (ASTM octane)					
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7 (2)	7 (2)	7(2)	7 (2)	7 (2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5	5.375– 5.5
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75 (1)	5.75 (1)	5.75 (1)	5.75 (1)
60 octane & below:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2
New York harbor, barges	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2	9.1 – 9.2
Philadelphia district	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5 –7.75 (2)	7.5 –7.75(2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	Sept. 28	Sept. 21
OKLAHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7.125
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6–7
72-74 oct.	5.75 – 6	5.75 – 6
63-66 oct.	5.375– 5.5	5.375– 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375(1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75(1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential teritory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	Sept. 28	Sept. 21
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct., "	5.875(1)	5.875 (1)
62 oct. "	5.5(1)	5.5 (1)
60 oct. & below, unleaded	5.375(1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 – 8 (2)	7.5 – 8 (2)
Str. run gasoline, excluding Detroit shpt.	5 – 6	5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	6 – 8.75	6 – 8.75
70-75 oct. (regular)	5.5 – 7.75	5.5 – 7.75
65 oct. & below (3rd grade)	4.5 – 6.75	4.5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	Sept. 28	Sept. 21
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5 – 4.625	4.5 – 4.625
Range Oil	4 – 4.125	4 – 4.125
No. 1 P.W.	3.875	3.875
No. 1 straw	3.875– 4 (1)	3.875–4 (1)
No. 2 straw	3.6 – 3.875	3.6 – 3.875
No. 3 fuel	3.5 (2)	3.5 (2)
U. G. I. Gas Oil	3.625–3.75 (1)	3.625 3.75 (1)
No. 6 fuel	$0.80-$0.90(2)	$0.80-$0.90(2)
14-16 fuel	$0.95 (1)	$0.95 (1)
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375– 4.625	4.375– 4.625
42-44 grav. w.w.	4.5 (2)	4.5 (2)
Range Oil	4 – 4.1 (2)	4 –4.1(2)
No. 1 p.w.	3.875– 4.125	3.875– 4.125
No. 2 straw	3.6 – 3.625	3.6 – 3.625
No. 3	3.5	3.5
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80-$0.85(2)	$0.80-$0.85(2)
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.125– 4.75	4.125– 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	4.3 (1)	4.3 (1)
KANSAS (For Kansas destinations only)		
41-43 grav. w.w.	No Price	No Price
42-44 gravity w.w.	4.8 –4.875 (2)	4.8 –4.875 (2)
No. 1 p.w.	4.25–4.3 (2)	4.25–4.3 (2)
No. 6 fuel	$0.85-$0.90(2)	$0.85-$0.90(2)

REFINERY PRICES (Continued)

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, Gas & Fuel Oil

(Continued)

Prices in Effect	Sept. 28	Sept. 21
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, for shpt. to Ark. points only.	5.125 (1)	5.125 (1)
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.25 – 7.75	6.25– 7.75
46 grav. w.w.	....	....
No. 1 fuel	6.25 – 7.75	6.25– 7.75
No. 2 "	6.25 – 7.625	6.25 – 7.625
No. 3 "	6.25–7.75(2)	6.25–7.75 (2)
36-40 gravity	6.25 –6.5(2)	6.25–6.5 (2)
Other districts:		
45 grav. w.w.	6.125– 7.625	6.125– 7.625
46 grav. w.w.	6.125– 6.25	6.125– 6.25
47 grav. w.w.	6.25 – 6.375	6.25 – 6.375
No. 1 fuel	5.875– 6	5.875– 6
No. 2 "	5.875– 7.125	5.875– 7.125
No. 3 "	5.875– 7.125	5.875– 7.125
36-40 grav., Pittsburgh dist. prices excluded	5.875– 7	5.875– 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.8 – 6	5.8 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw	5	5
U.G.I. gas oil	4.5 (2)	4.5 (2)
Fuel Oils (Vis. at 100).		
300-500 Vis.	.....	.....
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	4.5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$0.85 (2)	$0.85 (2)
Light fuel	$0.95 (2)	$0.95 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	5 (1)	5 (1)
Los Angeles:		
Heavy fuel	$0.80–0.85(2)	$0.80–0.85(2)
Light fuel	$0.85–0.95(2)	$0.85–0.95(2)
Diesel fuel	3.5 – 4 (2)	3.5 – 4 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
San Francisco:		
Heavy fuel	$0.90 (1)	$0.90 (1)
Light fuel	$1.00 (1)	$1.00 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals –No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	40.5 (1)	40.5 (1)
10 p.t.	39.5 (1)	39.5 (1)
15 p.t.	38.5 (1)	38.5 (1)
25 p.t.	28	30–33
150 Vis. (143 at 100°) 400-405 fl.		
0 p.t.	38.5 (1)	38.5 (1)
10 p.t.	37.5 (1)	37.5 (1)
15 p.t.	36.5 (1)	36.5 (1)
25 p.t.	26	28–31
Cylinder Stocks		
Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl	16	16
630 fl	17	17
MID-CONTINENT (F. o. b. Tulsa)		
Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)		
Pale Oils:		
Vis. Color		
60-85—No. 2	8	8
86-110—No. 2	8.5	8.5
150—No. 3	14.5	14.5
180—No. 3	15	15
200—No. 3	15	15
250—No. 3	16–16.5	16–16.5
280—No. 3	17	17
300—No. 3	18	18

Lubricating Oils (Cont'd)

Prices in Effect	Sept. 28	Sept. 21
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°		
200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (2)	22 (2)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

SOUTH TEXAS Neutral Oils

Vis. Color		
Pale Oils: (*Vis. at 100° F.*)		
100 No. 1½-2½	6.5	6.5
200 No. 2-3	8.75	8.75
300 No. 2-3	9.25	9.25
500 No. 2½-3½	10	10
750 No. 3-4	10.25	10.25
1200 No. 3-4	10.375	10.375
2000 No. 4	10.5	10.5
Red Oils:		
100 No. 5-6	6.5 (2)	6.5 (2)
200 No. 5-6	8.75	8.75
300 No. 5-6	9.25	9.25
500 No. 5-6	10	10
750 No. 5-6	10.25	10.25
1200 No. 5-6	10.375	10.375
2000 No. 5-6	10.5–11.5	10.5–11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils		
Vis. Color		
60-85—No. 2	9.5 (1)	9.5 (1)
86-110—No. 2	10 (1)	10 (1)
150—No. 3	15.5 (1)	15.5 (1)
180—No. 3	16 (1)	16 (1)
200—No. 3	16 (1)	16 (1)
250—No. 3	17 (1)	17 (1)
Red Oils:		
180—No. 5	16 (1)	16 (1)
200—No. 5	16 (1)	16 (1)
250—No. 5	17 (1)	17 (1)
280—No. 5	18(1)	18 (1)
300—No. 5	18.5 (1)	18.5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)		
140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)
Bright stocks, 160 vis. at 210 No. 8 color:		
0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3		
Grade 26-70	3.625(Qtns)	3.625 (Sale)
FOB BRECKENRIDGE		
Grade 26-70	3.25 (Qtns.)	3.25 (Qtns.)
CALIFORNIA (FOB plants in Los Angeles basin)		
21 pound vapor pressure for blending	4.75–5.375	4.75–5.375

Naphtha and Solvent

Prices in Effect	Sept. 28	Sept. 21
(FOB Group 3)		
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	7.875– 8.625	7.875– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7.2)	7 (2)
Stoddard solvent	7 – 7.25	7.25 –7.75
OHIO (S. O. quotations for statewide delivery): V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25 (2)
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L., FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)

CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)

Fully refined:		
122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)

Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.375	4.375– 5.375
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.625	3.125– 3.625
Red	3 – 3.5	3 – 3.5

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

(Cents Per Gal.)

	Gasoline Kerosine	*Distillate Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516
Decatur, Ill.	2.244	2.244	2.442
Joliet, Ill.	2.508	2.508	2.516
Peoria, Ill.	2.310	2.310	2.442
Quincy, Ill.	2.178	2.178	2.294
Indianapolis, Ind.	2.640	3.034	3.034
Evansville, Ind.	2.442	2.886	2.886
South Bend, Ind.	3.135	3.135	3.330
Detroit, Mich.	4.290	3.996	3.996
Grand Rapids, Mich.	3.828	3.828	3.922
Saginaw, Mich.	4.290	4.144	4.144
Green Bay, Wis.	2.838	2.838	3.182
Milwaukee, Wis.	2.706	2.706	2.738
La Crosse, Wis.	2.574	2.574	2.886
Minneapolis-St. Paul	2.574	2.574	2.886
Duluth, Minn.	2.838	2.838	3.256
Mankato, Minn.	2.574	2.574	2.886
Des Moines, Ia.	2.046	2.046	2.294
Davenport, Ia.	2.310	2.310	2.442
Mason City, Ia.	2.376	2.376	2.664
St. Louis, Mo.	2.046	2.046	2.072
Kansas City, Mo.	1.518	1.518	1.776
St. Joseph, Mo.	1.518	1.518	1.776
Fargo, N. D.	3.564	3.564	3.996
Huron, S. D.	3.036	3.036	3.330
Wichita			
From Ponca City	0.528	0.528	0.592
From Tulsa	0.858	0.858	0.962
From Cushing	0.792	0.792	0.888

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect Sept. 28

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc. Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	9.8(1)	9.2 -10.2	9.2(1)
N. Y. Harb., barges	9.7(1	9.1 - 9.2	9.1(1)
Albany	....	9.3 - 9.5	....
Philadelphia	....	9.2 - 9.7	9.2(1)
Baltimore	....	8.95	8.85(1)
Norfolk	....	8.7 - 8.95	8.5(2)
Wilmington, N. C.	....	8.7 - 8.8	8.4-8.5(2)
Charleston	....	8.7 - 8.8	8.1-8.4(2)
Savannah	....	8.25 - 8.75	8(1)
Jacksonville	....	8.275- 8.4	8-8.275(2)
Miami	....	8.275- 8.4	7.9-8.275(2)
Tampa	....	7.5 - 8.4	8-8.275(2)
Pensacola	....	7 -7.2(1)	6.6 -6.8(1)
Mobile	....	6.87 - 7.27	6.6 -6.8(1)
New Orleans	....	6.25 - 6.75	....
Portland	....	9.5 - 9.8	....
Boston	....	9.4 - 9.7	9.7(1)
Providence	....	9.4 - 9.7	....

FUEL OILS

	KEROSINE and /or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	6.8	6.7	6.7	$1.95-2.10 (a)	$1.65
N. Y. Harb., barges	6.7	6.6	6.6	....	....
Albany	7	6.8	6.8	$2.25(1)	$1.85(1)
Philadelphia	6.9	6.7	6.7	$1.98(2)	$1.65
Baltimore	6.9	6.7	6.7	....	$1.65
Norfolk	6.8 - 6.9	6.7	6.7(1)	....	$1.65(2)
Wilmington, N. C.	6.75	6.7	....	....	....
Charleston	6.9	6.7(2)	....	....	$1.60(2)
Savannah	6.75	....	....	....	$1.60(1)
Jacksonville	6.5	6.25(2)	6.25(1)	....	$1.60(1)
Miami	6.75(2)	....	....	....	....
Tampa	6.75	6.25(2)	....	....	$1.55 (1)
Pensacola	4.8(1)	....	....	....	....
Mobile	4.5 - 4.75	....	....	....	....
New Orleans	4.25 - 4.5	3.75 -3.875(2)	....	$1.25 (1)	$0.85(1)
Portland	7	6.8	6.8(2)	$2.25 (1)	$1.65(2)
Boston	6.9	6.7	6.7(2)	$1.95 (2)	$1.65
Providence	6.9	6.7	6.7	$1.90 -$1.95	$1.65

(a) This price is for a straight-run, low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65	$2.78	6.7-6.8(2)	6.8(2)
Albany	$1.85(1)	$2.98(1)	6.8(2)	7(1)
Philadelphia	$1.65	$2.78	....	....
Baltimore	$1.65	$2.78	6.7(1)	6.7(1)
Norfolk	$1.65	$2.78	6.7(1)	6.7(1)
Charleston	$1.60	$2.78(2)	6.7(1)	6.7(1)
Savannah	$1.60(1)	$2.62(1)	....	....
Jacksonville	$1.60(2)	$2.62(2)	....	....
Tampa	$1.55 (2)	$2.62(2)	....	....
New Orleans	$0.85	$1.55(2)	3.75(1)	3.75(1)
Portland	$1.65(2)	$2.86(2)	6.6(1)	6.9(1)
Boston	$1.65	$2.78	6.7(2)	6.8(2)
Providence	$1.65	$2.78(2)	6.7(1)	6.8(1)

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices in Effect Sept. 28

Crude Scale:	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow.	4.25(1)	....	4.25 (1)
122-4 White.	....	4.25(2)	4.25 (2)
124-6 White.	4.25 (1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Naphtha

Prices in Effect Sept. 28

	V.M.&P. Naphtha	Mineral Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices In Effect	Sept. 28	Sept. 21
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
398 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 octane	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44-grav. w.w. kero.	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price
In Ship's Bunkers, or deep tank lots:		
Diesel fuel, Pac. Spec. 200	$1.40 -$1.45	$1.40 -$1.45
Grade C fuel, Pac. Spec. 400	$0.825-$0.85	$0.825-$0.85
Cased Goods: (Per case)		
375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend, under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav. w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permitted on above rates by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

(Prices for sales made or firm offers reliably reported for sales pending in cargoes FOB ship at Gulf, for minimum of 20,000 bbls. Prices are by refiners only to other refiners, export agents, or to large tanker terminal operators at the customary trade specifications noted.)

Prices In Effect Sept. 28

Domestic

Motor Gasoline	
Min. 80 oct. '39 Research, max. 2cc lead	5.5
60-62 Gravity, Max. 400 e.p	
72-74 oct. leaded (ASTM)	5.25 - 6
70 oct. unleaded " "	5.25 - 5.75
68 oct. " "	5.25 - 5.5
65 oct. " "	5.25 - 5.75
60 oct.	5
41-43 w.w. kerosine	3.875- 4.375
No. 2 fuel	3.75
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	4
43-47 " "	4
48-52 " "	4
53-57 " "	4.125
58 & above diesel index	4.25
Diesel Oil, ship's bunkers (ex-lighterage)	$1.55 $1.68
Bunker C, " " "	$0.85 -$0.90
Bunker C, cargoes	$0.85

Export

Motor Gasoline	
60-62 Gravity, Max. 400 e.p.	
72-74 oct. leaded (ASTM)	5.25 - 6
70 oct. unleaded " "	5.25 - 5.75
68 oct. " "	5.25 - 5.5
65 oct. " "	5.25 - 5.75
60 oct.	5
41-43 w.w. kerosine	3.875- 4.375
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	4
43-47 " "	4
48-52 " "	4
53-57 " "	4.125
58 & above diesel index	4.25

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices in Effect Sept. 28

	Steel Drums	Bulk
200 vis. D 210 brt. stock	34-35 (2)	28.8 (2)
150 vis. D 210 brt. stock 0-10 p.p.	30-31 (2)	24.8 (2)
10-25 p.p.	29.5 (1)	24.3 (1)
100 vis. D 210 brt. stock 0-10 p.p.	29.5 (1)	24.3 (1)
10-25 p.p.	29 (1)	23.8 (1)
200 vis, No. 3 col. neutral: 0-10 p.p.	22 (1)	16.8 (1)

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline do not include taxes; they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; a few city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Sept. 28, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.

S. O. New Jersey

Esso (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	9.4
*Newark, N. J.	10.2	10.7	4.5	9.4
Annapolis, Md.	10.55	11.05	5.5	11.2
Baltimore, Md.	9.95	10.45	5.5	10.2
Cumberland, Md.	11.35	11.85	5.5	11.7
Washington, D. C.	10.2	10.7	4.5	10.7
Danville, Va.	11.65	12.15	6.5	11.95
Norfolk, Va.	10.45	10.95	6.5	11.7
Petersburg, Va.	10.75	11.25	6.5	12.7
Richmond, Va.	10.75	11.25	6.5	12.7
Roanoke, Va.	11.95	12.45	6.5	12.2
Charleston, W. Va.	12.25	12.75	6.5	13
Parkersburg, W. Va.	11.55	12.05	6.5	12.7
Wheeling, W. Va.	11.55	12.05	6.5	13.3
Charlotte, N. C.	12.1	12.6	7.5	11
Hickory, N. C.	12.65	13.15	7.5	12
Mt. Airy, N. C.	12.5	13.0	7.5	11.2
Raleigh, N. C.	11.85	12.35	7.5	12
Salisbury, N. C.	12.15	12.65	7.5	12.4
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	9.4	8.7	8.7
Newark	9.4	8.7	8.7
Annapolis, Md.	....	8.95	....
Baltimore	9.2	8.7	8.7
Washington, D. C.	9.7	9.1	9.1
Norfolk, Va.	9.4	8.5	8.5
Petersburg	9.7	8.7	....
Richmond	9.7	8.7	8.7
Charlotte, N. C.	10	10.1	....
Hickory, N. C.	....	9.7	....
Raleigh	11	9.8	....
Charleston, S. C.	....	8.7	....
Columbia	....	9.7	....
Spartanburg	....	10.5	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

	Com. Cons. T.W.	Undiv. Dlr. T.W.	Gasoline Taxes
New York City			
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kerosine Yard	Kerosine T.W.	Mobilfuel Diesel TC	Mobilfuel Diesel T.W.	Mobilheat Fuel Yard	Mobilheat Fuel T.W.
New York:						
Manhat'n & Bronx	7.1	9.5	....	9	7	8.7
Kings & Queens	7.1	9.5	....	9	7	8.7
Richmond	7	9.5	....	....	6.9	8.5
Albany	7.2	9.2	7	9	7	8.7
Binghamton	8.6	10.6	....	10.4	8.4	9.9
Buffalo	8.3	10.3	8	10	8.2	9.7
Jamestown	8.4	10.4	....	10.3	8.3	9.7
Mt. Vernon	7.2	9.7	....	9.1	7.1	8.7
Plattsburg	7.8	9.8	....	9.6	7.6	9.1
Rochester	8.4	10.4	7.9	9.9	7.9	9.4
Syracuse	8.2	10.2	7.8	9.8	7.8	9.3
Conn.:						
Bridgeport	7.3	9.3	....	....	7.2	8.5
Danbury	7.8	9.8	....	....	7.5	8.5
Hartford	7.4	9.4	....	9.2	7.2	8.7
New Haven	7.1	9.1	....	9	7	8.6
Maine:						
Bangor	7.6	9.6	7.4	9.4	7.4	8.8
Portland	7.2	9.6	7	9	7	8.7
Mass.:						
Boston	7.3	9.5	6.9	8.9	7.1	8.7
N. H.:						
Concord	8.1	10.1	....	....	8.2	9.7
Lancaster	9.2	11.2	....	....	9.2	10.7
Manchester	8.2	10.5	....	....	7.9	9.4
R. I.:						
Providence	7.3	9.3	6.9	8.9	7.1	8.6
Vermont:						
Burlington	7.8	9.8	7.5	9.5	7.5	8.9
Rutland	8	10	....	9.7	7.7	9.2

*Does not include 1% city sales tax appucable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)

	Commercial T.W.	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	11.65
Pittsburgh	10.7	11.2	5.5	12
Allentown	10.7	11.2	5.5	12
Erie	10.7	11.2	5.5	12
Scranton	10.7	11.2	5.5	12
Altoona	10.7	11.2	5.5	12
Emporium	10.7	11.2	5.5	12
Indiana	10.7	11.2	5.5	12
Uniontown	10.7	11.2	5.5	12
Harrisburg	10.7	11.2	5.5	12
Williamsport	10.7	11.2	5.5	12
Dover, Del.	....	11.2	5.5	12
Wilmington, Del.	....	10.7	5.5	11.5
Boston, Mass.	....	10.9	4.5	9.5
Springfield, Mass.	....	11.8	4.5	10.4
Worcester, Mass.	....	11.5	4.5	10
Fall River, Mass.	....	11	4.5	10.1
Hartford, Conn.	....	11.6	4.5	9.4
New Haven, Conn.	....	11	4.5	10.5
Providence, R. I.	....	11	4.5	10.1
Atlantic City, N. J.	....	10.7	4.5	9.4
Camden, N. J.	....	10.7	4.5	9.4
Trenton, N. J.	....	10.7	4.5	9.4
Annapolis, Md.	....	11.05	5.5	10.2
Baltimore, Md.	....	10.45	5.5	9.2
Hagerstown, Md.	....	11.55	5.5	9.7
Richmond, Va.	....	11.25	6.5	11.7
Wilmington, N. C.	....	11.55	7.5	11.3
Brunswick, Ga.	....	10.4	7.5	*10.5
Jacksonville, Fla.	....	10.4	8.5	11.5

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	6
Phila., Pa.	9.5	8.7	8.7	5.46	4.46
Allentown, Pa.	10	9	9	....	....
Wilmington, Del.	9.5	8.7	8.7	....	....
Springfield, Mass.	10.4	9.1	9.1	....	....
Worcester, Mass.	10	9	9	....	....
Hartford, Conn.	9.4	8.7	8.7	....	....

*Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio††

***Sohio X-70 Gasoline (*Regular Grade*)**

	Consumer T.W.	**Reselers	Gasoline ‡S.S. Taxes	†Kerosine T.W.
Ohio, Statewide	12	10	13.5	5.5	9
Akron	12	9.5	12.5	5.5	9
Cincinnati	12	9.5	12.5	5.5	9
Cleveland	12	9.5	12.5	5.5	9
Columbus	12	9.5	12.5	5.5	9
Dayton	12	9.5	12.5	5.5	9
Marietta	12	9.5	12.5	5.5	9
Portsmouth	12	9.5	12.5	5.5	9
Toledo	12	9.5	12.5	5.5	9
Youngstown	12	9.5	12.5	5.5	9

Aviation Gasoline—Statewide	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

†Naphtha—T.W.	Statewide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8	8	7.5	....
Cleveland	10	10	9.5	7.25

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos. 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price; 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Dealer Crown	Standard	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	9.5	8.5	6.5	9
Lexington, Ky.	10.5	8.5	6.5	9
Louisville, Ky.	10	9	6.5	8.5
Paducah, Ky.	9	8	6.5	8.5
Jackson, Miss.	10	9	7.5	*8.5
Vicksburg, Miss.	9.5	8.5	7.5	*8
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	*9
Atlanta, Ga.	11.4	...	7.5	*10.5
Augusta, Ga.	11.4	...	7.5	*10
Macon, Ga.	11.4	...	7.5	*10.5
Savannah, Ga.	10.4	...	7.5	* 9.5
Jacksonville, Fla.	10.4	...	8.5	9.5
Miami, Fla.	10.4	...	8.5	9.5
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	10.4	....	8.5	9.5

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax, Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	10	8.9	8.4	4.5	10.3
Decatur, Ill.	10	8.5	8	4.5	9.5
Joliet, Ill.	11.9	9.6	8.5	4.5	10.3

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified, per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes:** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes: also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Sept. 28, 1942 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W.	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	10.7	9.2	9.1	4.5	10.1
Quincy, Ill.	8.9	7.9	7.9	4.5	10
Indianapolis, Ind.	11.6	9.7	9.6	5.5	*9.8
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.6
South Bend, Ind.	12	10.5	10	5.5	*10.2
Detroit, Mich.	11.4	9.9	9.4	4.5	9.6
Grand Rapids, Mich.	10.1	8.6	8.1	4.5	9.6
Saginaw, Mich.	11.4	9.9	9.4	4.5	9.6
Green Bay, Wis.	12.2	10.7	9.7	5.5	10.6
Milwaukee, Wis.	12.1	10.6	10.1	5.5	10.5
La Crosse, Wis.	11.9	10.4	9.9	5.5	10.3
Minneapolis-St. Paul	11.9	9.9	9.5	5.5	10.3
Duluth, Minn.	12.2	10.7	10.2	5.5	10.6
Mankato, Minn.	11.9	10.4	9.5	5.5	10.3
Des Moines, Ia.	11.4	9.9	9.4	4.5	*9.8
Davenport, Ia.	11.7	10.2	9.7	4.5	*10.1
Mason City, Ia.	11.7	10.2	9.7	4.5	*10.1
St. Louis, Mo.	10.3	8.8	8.6	*4.5	9.8
Kansas City, Mo.	10.4	8.9	7.9	*4.5	9.4
St. Joseph, Mo.	9	9	8	*4.5	9.4
Fargo, N. D.	12.9	11.4	10.5	5.5	11.3
Huron, S. D.	12.3	10.8	10.3	5.5	10.7
Wichita, Kans.	9.7	8.2	6.5	4.5	8

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7	4.5
Milwaukee, Wis.	15.9	5.5
Minneapolis, Minn.	15.7	5.5
St. Louis, Mo.	15.2	*4.5
Kansas City, Mo.	14.8	*4.5
Fargo, N. D.	16.7	5.5
Huron, S. D.	16.1	5.5

(Prices are base prices before discounts)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo.	13.3	14.3	13.8	1.5
St. Louis, Mo.	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'is	14.2	15.2	13.5	5.5

Fuel Oils T.W.
Chicago

	Standard	Heater Oil
1-99 gals.		9
100-149 gals.		8
150 gals. & over		7.5

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.5	8.5
100-149 gals.	7.5	7.5
150-399 gals.	7.5	7.5
400 gals. & over	7	7

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals.	8	8
100-399 gals.	7	7
400-749 gals.	6	6
750 gals. & over	5.25	5.25

	Stanolex Bunker C Fuel Oil
1-399 gals.	6.5
400-999 gals.	5.5
1000 gals. & over	4.5

Other Points Indianapolis	Stanolex No. 1	Stanolex Furnace Oil
1-99 gals.	....	*8.7
100 gals. & over	....	*7.7
Detroit		
1-99 gals.	....	7.8
100 gals. & over	....	6.8
Milwaukee		
1-99 gals.	....	8.7
100 gals. & over	....	7.7
Minneapolis		
1-99 gals.	....	8.5
100 gals. & over	....	7.5
St. Louis		
1-99 gals.	8.3	7.8
100 gals. & over	7.3	6.8
Kansas City		
1-99 gals.	....	7.6
100 gals. & over	....	6.6

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 4c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

S. O. Nebraska

(*Regular Grade*)

	T.W. Dealer	Gasoline Taxes	Kerosine T.W.
Omaha	11.4 8.9	6.5	9.8
McCook	10.5 9.4	6.5	9
Norfolk	11.9 10.4	6.5	10.2
North Platte	11 9.9	6.5	10
Scottsbluff	12.4 9.5	6.5	9.5

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La.	8.75	9.25	8.5	*9
Baton Rouge, La.	8.75	9.25	8.5	*9.5
Alexandria, La.	8.75	9.25	8.5	*9.5
Lafayette, La.	9	9.5	8.5	*9
Lake Charles, La.	9	9.5	8.5	*11
Shreveport, La.	8.5	9	8.5	*8
Knoxville, Tenn.	9.5	10	8.5	12.5
Memphis, Tenn.	7.90	8.40	8.5	10.5
Chattanooga, Tenn.	10.5	11	8.5	11
Nashville, Tenn.	10.5	11	8.5	10
Bristol, Tenn.	10.95	11.45	8.5	13.1
Little Rock, Ark.	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax.
Discounts:
Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Humble Re-tail	Thriftane *Tank Wagon	Thriftane Re-tail	Gasoline Taxes
Dallas, Tex.	7.5†	7.5	6.5††	6.5	5.5
Ft. Worth, Tex.	8.5††	10.5	7.5‡	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Kerosine Retail
Dallas, Tex.	7	11
Ft. Worth, Tex.	7	11
Houston, Tex.	8	11
San Antonio, Tex.		10

	Tank Car
74 Oct. Aviation Gasoline, Clear FOB Baytown, Tex.	8.5

*To all classes of dealers & consumers.
‡Less 1½c allowance to dealers only.
††Less 2c allowance to dealers only.
†Less 2½c allowance to dealers only.

The Texas Co.

	Gasoline—Dealer Fire-Chief (*Regular*)	T.W. Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	6.5‡	5.5†	5.5
Ft. Worth, Tex.	8.5†	7.5**	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.
**Less 1.5c temporary allowance to all dealers.
†Less 2c temporary allowance to all dealers.
‡Less 2½c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition).

	Conoco Bronz-z-z (*Regular*) †Tank Wagon	De-mand (*3rd Grade*)	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah.	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	0.5	9.5	*7	10
Roswell, N. M.	10	9	*7	9.5
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.
†To consumers & dealers.

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Standard Posted Re-tail	Flight Posted Net Tank Truck	Flight Posted Re-tail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal.	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz.	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore.	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal.	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz.	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.5
Seattle, Wash.	13	6.5	13.5
Spokane, Wash.	16	6.5	16.5
Tacoma, Wash.	13	6.5	13.5

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.
Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 4c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.
†To divided & undivided dealers.

Tank Wagon Price Changes
(These changes have been made in price tables)

S. O. Indiana—Red Crown Gasoline:
Chicago t.w. cut 0.9c Sept. 12. Wichita t.w. cut 0.6c Sept. 16.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified, per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown

EASTERN & CENTRAL STATES FIELDS

PENNSYLVANIA GRADE

Posted by Jos. Seep Purch. Agency (Mar. 26, '42)

Bradford-Allegany $3.00
Southwest Penna. $2.65
Eureka (West Va.) $2.59
Corning, O. (May 27, '41) $1.31

Posted by The Pennzoil Co. (Mar. 26, '41)

National Transit $2.93*

Posted by Valvoline Pipe Lines (Mar. 26, '42)

Bradford (Elk & McKean Counties, (Pa.) $3.00
Warren, Forest, Venango, Clarion & Butler Counties, Pa. $2.93
Alleghany, Beaver, Washington & Greene Counties, Pa. $2.65
West Virginia $2.59
Southeastern Ohio $2.55

*Applies to Cochran, Franklin, Hamilton & Doolittle districts; prices in other lower districts range down to $2.88 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co. (May 27, '41)

Midland, Midland County $1.44
Sherman $1.39

Posted by Simrall Corp. (May 27, '41)

Greendale, Porter, Vernon, Crystal & Wise $1.44
Buckeye, Bentley, Edenville, Beaverton & Monitor (sweet crude type) $1.42
Freeman, Redding, Lincoln & Winterfield $1.39
West Branch-Arenac $1.24
Hamilton-Grout $1.29

Posted by Sohio Corp. (Mich. Div.)

Traverse crude in Allegan, Kent, Ottawa & Van Buren Cos. (June 2, '41) $1.45
Trenton crude, Monroe Co. (June 2, '41) $1.39

Posted by Bay Pipe Line Corp. (May 27, '41)

Saginaw & Wise $1.44
Buckeye, Bentley & Kawkawlin $1.42
Clare $1.11
Adams (June 1, '41) $1.27

ILLINOIS-INDIANA-KENTUCKY-OHIO

Posted by Sohio Corp. (May 21, '41)

Illinois Basin, including Griffin pool $1.37
Carmi, Storms, Ill. area $1.32
Birk City, Ky. area $1.32
Corydon, Ky. area, Henderson $1.32

Posted by Ohio Oil Co. (May 21, '41)

Illinois Basin $1.37
Eastern Ill. & Western Ind. $1.22

Posted by Carter Oil Co. (May 21, '41)

Loudon, Fayette Co. Ill. $1.37

Posted by Mohawk Oil Lines, Inc. (May 21, '41)

Southern Illinois $1.37

Posted by Ashland Oil & Transp. Co.

Somerset oil in Ash. Lines, Ky.; (June 19, '41)
Big Sandy River $1.38
Kentucky River $1.43

Posted by Ownesboro-Ashland Co.

Owensboro, Ky. area (May 21, '41) $1.32

Posted by S. O. Ohio (Sept. 1, '41)

Lima, Ohio $1.25
Cleveland, Lodi & Chatham (O). areas $1.30

MID-CONTINENT

OKLAHOMA-KANSAS-NORTH TEXAS

(See below for companies posting and dates)

Gravity	Schedule No. 1	Schedule No. 2	Schedule No. 3
Below 21	$0.85	$0.75	$0.81
21-21.9	.87	.78	.83
22-22.9	.89	.81	.85
23-23.9	.91	.84	.87
24-24.9	.93	.87	.89
25-25.9	.95	.90	.91
26-26.9	.97	.93	.93
27-27.9	.99	.96	.95
28-28.9	1.01	.99	.97
29-29.9	1.03	1.02	.99
30-30.9	1.05	1.05	1.01
31-31.9	1.07	1.07	1.03
32-32.9	1.09	1.09	1.05
33-33.9	1.11	1.11	1.07
34-34.9	1.13	1.13	1.09
35-35.9	1.15	1.15	1.11
36-36.9	1.17	1.17	1.13
37-37.9	1.19	1.19	1.15
38-38.9	1.21	1.21	1.17
39-39.9	1.23	1.23	1.19
40 & above	1.25	1.25	1.21

Above schedules posted by:

No. 1: **S. O. Indiana** May 20, '41 in Okla. & Kans. **Sinclair-Prairie** May 20, '41 in Okla. & Kans. beginning with 25-25.9. **Continental** May 19, '41 in Okla. & Kans. beginning with Below 29 at $1.01. **Texaco** May 19, in Okla. & Kans. beginning with 28-28.9.

No. 2: **Carter** May 20, '41 in Okla. **Shell** Dec. 5, '41 in Okla. & Kans. **Magnolia** May 21, '41 in Okla.

No. 3: All Dec. 11, '41: **Stanolind & Continental** in N. Tex. **Sinclair-Prairie** in N. Central Tex. **Magnolia & Texaco** in N. & N. Central Tex. **Continental, Magnolia & Sinclair-Prairie** schedules begin with Below 29 at $0.97. **Texaco** schedule begins with 28-28.9.

TEXAS & NEW MEXICO FIELDS

Posted by Humble Oil & Refining Co.

(May 21, '41, except Panhandle, Tex. July, 9 '41 and W. Central Texas Dec. 11, '41)

Gravity	Refugio	Texas Gulf Coast	Miran-do	Ana-huac	Dick-inson	East Central Texas	West Central Texas	Pan-handle, Texas	W. Texas & New Mex.	Hawkins Texas
Below 20	$1.08	$1.06	$1.03	$0.98	$0.93	....	....	$0.73	$0.70	$0.90
20-20.9	1.10	1.08	1.05	1.00	.95	....	....	.75	.72	.82
21-21.9	1.12	1.10	1.07	1.02	.97	....	....	.77	.74	.84
22-22.9	1.14	1.12	1.09	1.04	.99	....	....	.79	.76	.86
23-23.9	1.16	1.14	1.11	1.06	1.01	....	....	.81	.78	.88
24-24.9	1.18	1.16	1.13	1.08	1.03	....	....	.83	.80	.90
25 & above	....	....	....	....	....	....	....	....	....	.92
25-25.9	1.20	1.18	1.15	1.10	1.05	$0.97	$0.91	.85	.82	....
26-26.9	1.22	1.20	1.17	1.12	1.07	.99	.93	.87	.84	....
27-27.9	1.24	1.22	1.19	1.14	1.09	1.01	.95	.89	.86	....
28-28.9	1.26	1.24	1.21	1.16	1.11	1.03	.97	.91	.88	....
29-29.9	1.28	1.26	1.23	1.18	1.13	1.05	.99	.93	.90	....
30-30.9	1.30	1.28	1.25	1.20	1.15	1.07	1.01	.95	.92	....
31-31.9	1.32	1.30	1.27	1.22	1.17	1.09	1.03	.97	.94	....
32-32.9	1.34	1.32	1.29	1.24	1.19	1.11	1.05	.99	.96	....
33-33.9	1.36	1.34	1.31	1.26	1.21	1.13	1.07	1.01	.98	....
34-34.9	1.38	1.36	1.33	1.28	1.23	1.15	1.09	1.03	1.00	....
35-35.9	1.40	1.38	1.35	1.30	1.25	1.17	1.11	1.05	1.02	....
36-36.9	1.42	1.40	1.37	1.32	1.27	1.19	1.13	1.07	1.04	....
37-37.9	1.44	1.42	1.39	1.34	1.29	1.21	1.15	1.09	1.06	....
38-38.9	1.46	1.44	1.41	1.36	1.31	1.23	1.17	1.11	1.08	....
39-39.9	1.48	1.46	1.43	1.38	1.33	1.25	1.19	1.13	1.10	....
40 & above	1.50	1.48	1.45	1.40	1.35	1.27	1.21	1.15	1.12	....

Refugio: Includes crude purchased in East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth, Saxet, Taft, & Tom O'Connor fields.

Texas Gulf Coast: Includes crude purchased in Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa, Mykawa New, Racoon Bend, South Thompsons, Sugarland, Thompsons, & Webster fields.

Mirando: Includes crude purchased in Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North & South), Heyser, Hoffman, Kelsey, Kobler, Loma Novia, Lundell, Manilla, Mirando Valley, Placedo, Randado, Sarnosa, & Tesoro fields.

Anahuac: Includes crude purchased in Anahuac, Angleton, Cedar Point, Fishers' Reef, Hull, (Old & New), Pierce Junction, Red Fish Reef, & Turtle Bay fields.

Dickinson: Includes crude purchased in Dickinson, Gillock, Hardin, League City, & Rowan fields.

East Central Texas: Includes crude purchased in Anderson, Cherokee, Limestone, & Navarro Counties, and Navarro Crossing field.

West Central Texas: Includes crude purchased in Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, & Throckmorton Counties.

Panhandle, Texas: Includes crude purchased in Carson, Gray, Hutchinson & Wheeler Counties.

West Texas & New Mexico: Includes crude purchased in Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler, & Yoakum Counties, Texas; Lea County, N. M.

Hawkins: Includes crude purchased in Hawkins Field, Wood County, Texas.

Conroe $1.43
Tomball 1.40
Van 1.08
Talco 0.79
East Texas & Flag Lake $1.25
Flour Bluff, E. Flour Bluff 1.33
Salt Flat, N. Salt Flat 1.14
Darst Creek, Hilbig, Carroll 1.14
Clark, Zoboroski $1.14
Alice, Benavides (N. Sweden), Sun 1.35
Ben Bolt, Clark-Muil, Tom Graham 1.35
Yates (Pecos) 0.95
La Rosa 1.33

MAGNOLIA PETROLEUM CO.

(May 21, '41)

Panhandle, Tex.—(July 9, '41)—Same as Humble except Magnolia begins with below 29 at $0.91.
West Texas—In Crane, Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum & Gaines Cos., and in Pecos & Andrews Cos. beginning Apr. 1, '42—Same as Humble except Magnolia begins with Below 25 at $0.80.
N. Mexico—In Lea Co.—Same as Humble except Magnolia begins with Below 25 at $0.88 & ends with 36 & above at $1.04.
Cass & Panola Cos., Tex.—Below 25 at $0.88, plus 2c per degree of gravity to 40 & above at $1.20.
Mirando, Tex.—Same as Humble.

East Texas $1.25
Darst Creek 1.14
Luling 1.05
Talco ..... .79
Lytton Springs $1.17
Cleveland-Liberty Co. 1.26
Tomball 1.40

SINCLAIR-PRAIRIE OIL MARKETING CO.

Texas Panhandle—(May 23, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.83.
West Texas & New Mexico—(May 30, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.80.
Texas Gulf Coast—(May 21, '41)—Same as Humble.
Mexia District, Texas—(May 30, '41)—Same as Humble, East Central Texas, except Sinclair-Prairie also posts Below 25 at $0.95.
East Texas—(May 21, '41) $1.25
Long Lake, Texas—(May 21, '41) $1.23
Chapel Hill (Washington Co.) Tex.:
Below 50 grav. (Jan 20, '42) $1.18
50 grav. & above (Feb. 2, '42) $1.25

STANOLIND OIL PURCHASING CO.

(May 21, '41)

Clinton, Tex.—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.
Fairbanks, N. Houston & Rosslyn, Tex.—Same as Humble Dickinson schedule.
Lake Creek, Tex.—(Apr. 9, '42)—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.
E. Texas $1.25
Satsuma & Tomball, Tex. $1.40
Eureka Heights (Harris Co.)—Aug. 1, '42 ..... $1.15

STANOLIND OIL & GAS CO.

(May 21, '41)

W. Beaumont & Spindletop (Jefferson Co., Tex.) **& Highland Island** (Galveston Co., Tex.)—Same as Humble Tex. Gulf Coast.
Hendrick & Henderson (Winkler Co., Tex.)—Same as Humble West Texas except Stanolind begins with Below 26 at $0.82.
Jay Welder (Calhoun Co., Tex.)—Nov. 14, '41—Same as Humble Anahuac.
Spencer & Pyote (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas.
Magnolia Sealey South (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas except Stanolind ends with 36 & above at $1.04.

THE TEXAS CO.

(May 21 '41)

Panhandle, Tex.—Same as Humble except Texaco begins with 34-34.9 at $1.03.
W. Texas & Lea Co., N. M.—Same as Humble except Texaco posts $0.78 for 23.9 & below and ends with 36 & above at $1.04.
Texas Gulf Coast—Same as Humble except Texaco ends with 34 & above at $1.36.
Duval, Mirando, Tex.—Same as Humble Mirando except Texaco ends with 28-28.9 at $1.21.
Refugio, Tex.—Same as Humble except Texaco ends with 28-28.9 at $1.26.

East Texas $1.25
Darst Creek, Tex. $1.14
Conroe, Tex. $1.43
Hockley & Cochran Cos., Tex. ..... .87

SHELL OIL CO., INC.

(May 20, '41)

West Texas & Lea Co., N. M.—Same as Humble except Shell ends with 36 & above at $1.04.
Fisher Co., Tex.—(Dec. 11, '41)—Same as Humble W. Central Texas except Shell begins with Below 25 at $0.89.

East Texas $1.25
Livingston field, Polk Co., Tex. $1.25
Pecos Co., Texas, (except Yates Shallow Pool) ..... .95
Pecos Co., Tex., Yates Shallow Pool ..... .82
Mercy field, San Jacinto Co., Tex. (Feb. 27, '42) 1.25

CONTINENTAL OIL CO.

Carson & Hutchinson Cos., Tex.—(July 9, '41)—Same as Humble Panhandle except Continental begins with Below 29 at $0.91.
Mirando, Tex.—(July 1, '41—Same as Humble.
Wade City & Clara Driscoll, Tex.—(July 1, '41)—Same as Humble Refugio.
Alfred & Magnolia City, Tex.—(May 21, '41), $1.35
Eddy Co., N.M.—(May 30, '41)—Same as Humble N. M. schedule except Continental begins with Below 29 at $0.88.

PAN AMERICAN PRODUCTION CO.

(May 21, '41)

Hastings & S. Houston, Tex.—Same as Humble Tex. Gulf Coast except Pan Am. begins with Below 21 at $1.08.
Gillock, Tex.—Same as Humble Dickinson except Pan Am. begins with Below 21 at $0.95.

East Texas $1.25
Cayuga, Tex. ..... .90
Goodrich, Tex. (Dec. 1, '41) 1.20

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

CALIFORNIA

Posted by S. O. California, May 23, 1941

(All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Gravity
14-14.9	....	$0.68	....	....	$0.71	....	$0.70	....	$0.70	$0.70	$0.70	$0.72	....	....	....	....	....	$0.73	$0.73	$0.73	14-14.9
15-15.9	....	.71	....	....	.75	$0.76	.72	....	.72	.71	.72	.72	....	....	....	....	....	.73	.73	.73	15-15.9
16-16.9	....	.74	$0.79	....	.79	.79	.75	....	.74	.73	.75	.72	....	....	....	....	....	.73	.75	.73	16-16.9
17-17.9	....	.78	.82	....	.82	.82	.78	....	.77	.76	.78	.72	....	....	....	....	....	.75	.78	.73	17-17.9
18-18.9	$0.80	.82	.86	....	.86	.85	.81	....	.80	.79	.82	.74	....	....	....	....	....	.78	.81	.73	18-18.9
19-19.9	.84	.86	.90	....	.89	.88	.85	....	.83	.82	.85	.77	....	....	....	....	$0.73	.81	.84	.75	19-19.9
20-20.9	.88	.90	.94	....	.93	.92	.88	....	.86	.85	.89	.80	....	....	....	....	.76	.85	.87	.77	20-20.9
21-21.9	.92	.94	.98	....	.96	.95	.91	....	.89	.89	.92	.84	....	....	....	....	.79	.90	.90	.80	21-21.9
22-22.9	.96	.98	1.02	$0.88	.99	.98	.95	....	.93	.93	.96	.87	....	....	....	....	.83	.94	.93	.83	22-22.9
23-23.9	1.00	1.02	1.05	.92	1.02	1.01	.98	....	.97	.98	1.00	.91	....	....	....	....	.87	.99	.96	.86	23-23.9
24-24.9	1.03	1.06	1.07	.97	1.05	1.04	1.01	....	1.01	1.02	1.03	.94	$0.99	....	....	....	.90	1.03	.99	.89	24-24.9
25-25.9	1.07	1.09	1.10	1.01	1.08	1.07	1.04	....	1.05	1.06	1.07	.98	1.02	....	....	....	.94	1.07	1.01	.92	25-25.9
26-26.9	1.11	1.12	1.12	1.06	1.11	1.10	1.08	....	1.09	1.10	1.11	1.01	1.06	....	....	....	.97	1.11	1.04	.95	26-26.9
27-27.9	1.15	1.15	1.15	1.10	1.14	1.14	1.11	....	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	1.07	.98	27-27.9
28-28.9	1.18	1.18	1.17	1.15	1.17	1.17	1.14	....	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.10	1.00	28-28.9
29-29.9	1.20	1.21	....	1.19	1.20	1.20	....	$1.17	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.13	1.02	29-29.9
30-30.9	1.23	1.24	....	....	1.23	1.22	....	1.21	....	Elwood	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.16	1.04	30-30.9
31-31.9	....	....	....	....	....	1.24	....	1.25	....	Terrace	....	1.19	1.24	1.19	1.04	1.12	1.14	....	.....	1.06	31-31.9
32-32.9	....	....	....	....	....	....	....	1.29	....	F.o.b. Ship		1.23	1.28	1.23	1.07	1.14	1.17	....	....	1.09	32-32.9
33-33.9	....	....	....	....	....	....	....	1.32	....	$1.22	....	1.27	....	1.26	1.10	1.17	....	....	....	1.11	33-33.9
34-34.9	Kettleman Hills			....	....	....	....	1.36	....	1.25	....	1.31	....	1.30	1.13	1.20	....	....	....	1.13	34-34.9
35-35.9	....	$1.23	....	....	....	....	....	....	....	1.28	....	1.35	....	....	1.16	1.22	....	....	....	....	35-35.9
36-36.9	....	1.26	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	....	36-36.9
37-37.9	....	1.29	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	....	37-37.9
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	38-38.9
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	39-39.9
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	40-40.9

Playa Del Rey: (FOB Standard Pipe Line) 20-20.9, $0.80; 21-21.9, $0.84; 22-22.9, $0.87.
Wheeler Ridge: 22-22.9, $0.76; 23-23.9, $0.80; 24-24.9, $0.83.
Newhall, Kern River, Kern Front, McKittrick & Round Mountain: 14-14.9, $0.73.

LOUISIANA-ARKANSAS

Posted by S. O. Louisiana, May 22, '41

Gravity	Atlanta, Ark. et al.	De Soto, La. et al.	Rodessa, La. et al.	Bunkie, La. et al.	Darrow, La. et al.	University, La.* (Baton Rouge) Shallow Production
40 & Above	$1.08	$1.18	$1.20	$1.30	$1.30	$1.48
39-39.9	1.06	1.16	1.18	1.28	1.28	1.46
38-38.9	1.04	1.14	1.16	1.26	1.26	1.44
37-37.9	1.02	1.12	1.14	1.24	1.24	1.42
36-36.9	1.00	1.10	1.12	1.22	1.22	1.40
35-35.9	.98	1.08	1.10	1.20	1.20	1.38
34-34.9	.96	1.06	1.08	1.18	1.18	1.36
33-33.9	.94	1.04	1.06	1.16	1.16	1.34
32-32.9	.92	1.02	1.04	1.14	1.14	1.32
31-31.9	.90	1.00	1.02	1.12	1.12	1.30
30-30.9	.88	.98	1.00	1.10	1.10	1.28
29-29.9	.86	.96	.98	1.08	1.08	1.26
28-28.9	.84	.94	.96	1.06	1.06	1.24
27-27.9	.82	.92	.94	1.04	1.04	1.22
26-26.9	.80	.90	.92	1.02	1.02	1.20
25-25.9	.78	.88	.90	1.00	1.00	1.18
Below 25	....	.86	.88	.98	....	....
24-24.9	.76	....	.88	....	.98	1.16
23-23.9	.74	....	.86	....	.96	1.14
22-22.9	.72	....	.84	....	.94	1.12
21-21.9	.70	....	.82	....	.92	1.10
Below 21	.68	....	.80	....	.90	....
20-20.9	....	....	....	....	....	1.08
Below 20	....	....	....	....	....	1.06

*Posted July 2, '42.

Atlanta schedule includes Buckner, Lewisville, Magnolia, Village & Schuler (Jones Sand), Ark.

De Soto schedule includes Sabine, Fouke, Homer, Miller co., Nebo & Sugar Creek, Lake St. John (4500 ft. prod.) Sept. 5, '42.

Rodessa schedule includes Cotton Valley & Shreveport (Cross Lake) ending with Below 25 at $0.88; Anse La Butte (Aug. 1, '41); Caddo (Oct. 15, 1941).

Bunkie schedule includes Eola, Olla, South Olla, Pine Prairie (May 21, '42), and University (Baton Rouge) Deep Production (May 22, '42).

Darrow schedule includes Bayou Mallet, Choctaw, Jeanerette, Lirette, N. & S. Crowley, Port Allen, Port Barre, Potash, Roanoke, & St. Martinville.

Big Creek, Dorcheat, McKamie, Distillates (Sour) $1.15
Heavy Smackover Crude ..... .83
Cotton Valley Distillate (Sept. 1, '41) 1.40
Cotton Valley (Holloway Sand Crude) 1.25
Lisbon Distillate 1.20

(Continued next column)

LOUISIANA-ARKANSAS *(Cont'd)*

Posted by Shell Oil Co., Inc. (May 20, '41)

Gravity	Iowa	Roanoke	Gibson
Below 20	$0.99	$0.94	$0.89
20-20.9	1.01	.96	.91
21-21.9	1.03	.98	.93
22-22.9	1.05	1.00	.95
23-23.9	1.07	1.02	.97
24-24.9	1.09	1.04	.99
25-25.9	1.11	1.06	1.01
26-26.9	1.13	1.08	1.03
27-27.9	1.15	1.10	1.05
28-28.9	1.17	1.12	1.07
29-29.9	1.19	1.14	1.09
30-30.9	1.21	1.16	1.11
31-31.9	1.23	1.18	1.13
32-32.9	1.25	1.20	1.15
33-33.9	1.27	1.22	1.17
34 & above	1.29	1.24	1.19

Iowa schedule includes Black Bayou & White Castle La. fields.

Roanoke schedule includes Chalkley, La. field.

Gibson schedule includes S. Houma, Hester & W. Lake Verret, La. fields.

Happytown field, St. Martin Par., La. $1.15

Posted by Arkansas Fuel Oil Corp.

Urania, La. (May 22, '41) $1.15

Posted by Continental Oil Co. (May 21, '41)

Tepetate, La. $1.18
Ville Platte, La. 1.20
Lake Arthur, La. 1.18
Ritchie, La. (Sept. 1, '41) 1.08

Abbeville, La.

Below 36 $1.07	37-37.9 $1.11	39-39.9 $1.15
36-36.9 1.09	38-38.9 1.13	40 & above 1.17

CANADIAN FIELDS

Posted by Imperial Oil Limited
Western Ontario (Nov. 6, 1939)

Petrolia ..... $2.10 Oil Springs $2.17

Turner Valley Crude Oil (July 16, '41)
(Prices FOB producer's tankage)

33-33.9 $1.35	44-44.9 $1.57	55-55.9 $1.79	
34-34.9 1.37	45-45.9 1.59	56-56.9 1.81	
35-35.9 1.39	46-46.9 1.61	57-57.9 1.83	
36-36.9 1.41	47-47.9 1.63	58-58.9 1.85	
37-37.9 1.43	48-48.9 1.65	59-59.9 1.87	
38-38.9 1.45	49-49.9 1.67	60-60.9 1.89	
39-39.9 1.47	50-50.9 1.69	61-61.9 1.91	
40-40.9 1.49	51-51.9 1.71	62-62.9 1.93	
41-41.9 1.51	52-52.9 1.73	63-63.9 1.95	
42-42.9 1.53	53-53.9 1.75	64 & over 1.97	
43-43.9 1.55	54-54.9 1.77		

Absorption Gasoline (July 16, '41)

90% Rec., 20 lb. Reid v.p. $2.28
90% Rec., 17 lb. Reid v.p. 2.44

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co. (May 20, '41)

Salt Creek (except Tensleep crude), Midway & Dutton Creek, Wyo.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Wyoming:		Wyoming:	
Tensleep Crude	$0.6785	Grass Creek Light	$1.00
Frannie Light	.70	Grass Creek Heavy	.50
Frannie Heavy	.47	Elk Basin	1.00
Hamilton Dome	.45	Iles, Colo.	1.07

Posted by Ohio Oil Co. (May 20, '41)

Elk Basin, Wyo. $1.00
Grass Creek, Wyo., Light 1.00
Rock Creek, Wyo. 1.15
Lance Creek, Wyo., (July 1, '41) 1.12

Posted by Continental Oil Co. (May 21, '41)
Ft. Collins & Wellington, Col.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Canon City & Florence, Col. $1.05	Big Muddy, Wyo., (May 30, '41) ... $1.08
Cat Creek, Mont. .. 1.15	Lance Creek, Wyo., (July 1, '41) 1.12

Posted by Independent Pipe Line Co. (Aug. 1, '41)

Falls City, Neb., field price $0.90
Falls City, Neb., loaded in tank cars 0.95
Shubert, Neb., loaded in tank cars 0.97

SOUTHEASTERN FIELDS

Posted by Allied Pipe Line Corp.

Tinsley (Miss.) Crude (Oct. 16, '41)

24-24.9	$0.745	32-32.9	$0.905
25-25.9	.765	33-33.9	.925
26-26.9	.785	34-34.9	.945
27-27.9	.805	35-35.9	.965
28-28.9	.825	36-36.9	.985
29-29.9	.845	37-37.9	1.005
30-30.9	.865	38-38.9	1.025
31-31.9	.885	39-39.9	1.045
		40 & above	1.065

Pickens (Miss.) Crude (Dec. 16, '41)

24-24.9	$0.685	32-32.9	$0.845
25-25.9	.705	33-33.9	.865
26-26.9	.725	34-34.9	.885
27-27.9	.745	35-35.9	.905
28-28.9	.765	36-36.9	.925
29-29.9	.785	37-37.9	.945
30-30.9	.805	38-38.9	.965
31-31.9	.825	39-39.9	.985
		40 & above	1.005

CLASSIFIED

Address Blind Box Number ads to National Petroleum News, 530 Penton Building, Cleveland, Ohio, unless otherwise specified.

Situations Open

SALESMAN to call on oil jobbers in North-Central states. Give history, age, experience, draft status, reference, car, etc. Address Box No. 149, National Petroleum News.

WANTED
Refinery Design Engineer

Permanent position for man with thorough knowledge of pressure vessel and piping design. Experience as chief draftsman and construction engineer is desirable. Location middle west. Medium size independent company. In reply please specify personal data, experience, draft status and salary required.

Reply Box No. 150

For Sale

For Sale (Michigan) Two Semi Four Wheel Gas Tank Trains, (4 vehicles) no tractors. GMC 5 years old, Heil Tanks 2500 gal. capacity. Each vehicle needs tires otherwise ready to work. Air brakes. Box No. 151.

For Sale—One Portable Ranarex CO_2 Recorder. Used only 4 times. One Brown Pyrometer and one Hays Draftgauge. Above equipment hardly used and all complete with attachments. Price $250.00. Cost $350.00. Box No. 153.

One gasoline refining still. **Batch type.** 3000 gallons capacity. Used sixty days. **Available for immediate shipment with breeching and stack.** 5'0" dia. by 16'6" tangent length. **Flanged and dished** heads ½" thick, lower portion **of shell ½"** firebox steel, upper portion of shell **⅜" flange** steel. A.S.M.E. code construction 15 lbs. w.p. Price $550.00. Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn.

Position Wanted

BUSINESS MANAGER—College graduate, majored in economics. 5 years major oil; 2 years local fuel-coal-feed company experience. Draft 3A. Box No. 152.

Wanted to Buy

WANTED

Steel Storage Tanks from 5,000 to 25,000 gallon. Send full details including dimensions, thickness of plate and best price f.o.b. cars, for immediate sale.

Brill Equipment Corporation
183 Varick Street,
New York, N. Y.

Professional Services

PHOENIX
CHEMICAL LABORATORY
An Exclusive Petroleum Testing Laboratory
Equipped For All Known Tests & Research in Petroleum Products
3953 Shakespeare Ave., Chicago
Telephone—Spalding 3578

GEORGE A. BURRELL
Petroleum and Gas Engineer
Design Construction Reports

Suite 1909,
20 Pine Street
New York City

1936-42 Fifth Ave.
Pittsburgh, Pa.

ANTI-KNOCK VALUES
DETERMINATIONS
The Gray Industrial Laboratories
Chemists and Engineers
Specialists on Petroleum Products
961-976 Frelinghuysen Ave.,
NEWARK, N. J.
Telephone Bigelow 3-4020

National Petroleum News

Copyright 1942 by The National Petroleum Publishing Co.

Trade Mark Registered U. S. Patent Office

Published every Wednesday by The National Petroleum Publishing Co.

WARREN C. PLATT, *Editor and Publisher*
V. B. GUTHRIE, *Managing Editor*

Member of Audit Bureau of Circulation and Associated Business Papers Inc.

Publication office: 1213 W. Third St., Cleveland, Ohio, U. S. A. Telephone, CHerry 7672. Cable Address PLATTOIL, Cleveland. Cable inquiries are answered by mail unless subscriber advances sufficient funds in American money to cover our cable costs.

NEWS BUREAUS

New York, 50 W. 50th Street, Telephone Columbus 5-1516 and 5-1517.

Washington, D. C., 1034-36-38 National Press Bldg., Telephone, NAtional 3477.

Tulsa, Okla., 904 World Bldg., Telephone, 3-7132.

Los Angeles, 610-A Hillstreet Bldg., Telephone, VAndike 2845.

Chicago, 59 E. Van Buren Street, Telephone, Harrison 5901-2-3.

Subscription rate $5 per year in United States, Mexico and Pan-American Countries; $6.50 in Canada and Foreign Countries. Current copies 20 cents, except special issues; back copies more than two months old 30 cents per copy.

Classified Rates

"For Sale," "Wanted to buy," "Help Wanted," "Business Opportunities," "Miscellaneous" classifications, set in type this size without border—15 cents a word. Minimum charge, $4.00 per insertion.

"Position Wanted"—10 cents a word. Minimum charge $1.50 per insertion.

Advertisements set in special type or with border—$5.00 per column inch.

Copy must reach us not later than Saturday preceding date of issue.

All advertisements carried on this page are payable in advance.

No agency commission or cash discounts on classified Advertisements.

ADVERTISERS' INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions.

Acheson Colloids Corp.
American Industries Salvage Committee
American Flange & Mfg. Co.
Autocar

Badger & Sons Co., E. B.,
Battenfeld Grease & Oil Corp.
Bayou State Oil Co.
Birmingham Tank Co. 36
Blackmer Pump Co.
Bowser & Co., S. F.
Bradford Oil Refg. Co.
Brodie Co. Inc., Ralph N. Inside Front Cover
Buckeye Iron & Brass Works
Butler Manufacturing Co. 28, 29

Champion Spark Plug Co.
Cities Service Oil Co. 33
Coastal Tank Lines
Continental Can Co.
Crown Can Co. 13

Erie Meter Systems, Inc.
Ethyl Gasoline Corp.

Farrell Mfg. Co.
Fleet-Wing Co.
Freedom Oil Co.
Fruehauf Trailer Co.

General American Trans. Corp.
General Motors Corp.
Gilbert & Barker Mfg. Co. Outside Back Cover
Goodrich, B. F.
Goodyear Tire & Rubber Co. 17
Gulf Oil Corp. 31

Heil Co.
Humble Oil Co.

International Harvester Co.
International Metal Hose Co.

Johnston & Jennings Co.

Kidde & Co. Inc., Walter

McDonald Mfg. Co., A. Y.
Mack Trucks, Inc.
Master Electric Co.
Morrison Bros.

Neptune Meter Co.

Penna. Grade Crude Oil Assn.
Philadelphia Valve Co.
Pittsburgh Equitable Meter Co.
Platt's Oilgram Inside Back Cover
Pure Oil Co.

Reeves Brothers
Republic Oil Co.
Revere Electric Mfg. Co.

Scully Signal Co. 35
Seiberling Rubber Co. 24, 25
Service Station Equipment Co.
Shell Oil Co., Inc.
Sinclair Refg. Co., Inc. 20, 21
Smith Meter Co.
Socony-Vacuum Oil Co.
Standard Steel Works
Stearns & Co., E. C.
Sun Oil Co.

Texaco Development Corp.
Thiokol Corp.
Thornton Tandem Co.
Timken Detroit Axle Co.
Tokheim Oil Tank Co.
Trucktor Corp.

Union Tank Car Co.
Universal Oil Products Co.

Viking Pump Co.

Wayne Pump Co.
Wilson & Bennett Mfg. Co.
Witte Engine Co.

PERSONALS

Seventy-six played golf and 100 attended the luncheon and dinner at the annual fall golf outing of the New Jersey Oil Trade Assn. held Sept 24 at Suburban Golf Club, Elizabeth, N. J., **Joseph H. Gunn,** N.J.O.T.A. secretary reports. **Frank G. Campbell,** Sun Oil Co., chairman of the outing committee, distributed War Savings Stamps as prizes to winners. **Frank P. Gill,** N.J.O.T.A. vice president, was toastmaster at the dinner.

Walter W. Krautter, Maplewood, Krautter Transportation Co., won chief honors with a score of 42-35-77, the best score of the day and first in the Class A group. Mr. Campbell registered the second best tally of the day with a score of 40-41-81 and was awarded first prize in the "kickers' handicap".

Other winners and their scores were: Class A—first net, **C. R. McCarren,** 69; second low net, **R. S. Ireland,** 72. Class B—low gross winner, **Benjamin B. Bloys,** 91; first net, **A. D. Cecil,** 74; second low net, **Mitchel Rile,** 75. Class C—low gross winner, **J. P. Maloney,** 98; first net, **G. W. Wells,** 74; second net, **Milton Maybaum,** 74. Kickers' Handicap—second, **H. W. Callender,** 76; third, **Kenneth O'Brien,** 78

J. G. Jung, a guest, won a door prize and received a round of applause when he came forward to receive it.

* * *

Edward H. Ryan, head of the Pacific Oil Co.'s branch at Newport, R. I., for the past 7 years, has accepted a position as superintendent of a U. S. Naval establishment at East Boston, Mass. Mr. Ryan previously worked for the New England Oil Co. and with New Jersey Standard. He has served as chairman of the credit bureau of Newport's Chamber of Commerce; as a director of the Lions Club; and as a member of the Rhode Island Petroleum Industries Committee.

* * *

Herbert L. Clay, secretary-treasurer of Kentucky Petroleum Marketers Assn., is on a two-week vacation. "Herb" did not announce the location of his vacation spot, but left word that he could be reached at any time through the association office. This to those in the "know" means that he is officially on vacation, but off the record is still sweating with K.P.M.A. affairs, as he has been doing for the past 11 years.

* * *

William C. Bowen, jobber, who with his father, **A. F. Bowen,** operated the Ideal Oil Co., Smithfield, N. C., is another recruit to the U. S. Navy air force, according to bulletin released by **W. A. Parker,** secretary of the North Carolina Oil Jobbers Assn.

* * *

Thirty-third Masonic degree, conferred upon him a year ago, was awarded last week in Boston to **O. D. Donnell,** Findlay, Ohio, president of the Ohio Oil Co.

* * *

Because "Freestone County's own Bill Boyd has made a success of everything he tackled", **W. R. Boyd, Jr.,** A.P.I. president and chairman of the Petroleum Industry War Council, is the selection of the editor of *The Fairfield Recorder* for the vice-presidency of the nation. The *Recorder's* editor would have offered him for president, except that "no Texas man has a chance at this job, since the northern so-called Democrats just can't stand to think of a Texas man for the presidency".

Thus wrote the editor in the *Recorder* of Sept. 10, summing up his argument like this: "Since Texas boys are going to win the war, and Texas is furnishing the most airplanes, pilots, marines, and food, wool, meat, cotton, etc.—the state is entitled to a least a vice-president—and Bill Boyd's the man."

* * *

Kenneth A. Ayers, Seattle, of California Standard, Northwest section chairman of the Society of Automotive Engineers, will assist at the S.A.E. National Aircraft Production Meeting at Los Angeles on Oct. 1-3.

* * *

Fall golf party of the Chicago Oil Men's Club was held Sept. 17 at Brookwood Country Club, Elmhurst, Ill. Feature event of the outing was a match between representatives of the Wisconsin Petroleum Assn. and the Chicagoans—won 14 to 2 by the C.O.M.C. Chicago also won last year while Wisconsin won in 1939 and 1940. **Al Smith,** Calumet Refining Co., had the best individual member's score and **O. K. Moore,** Apex Motor Fuel Co., won first place for guests. The tournament was arranged by **Wilson Henry,** Valvoline; program was directed by **Charles Hirth,** Hughes Oil Co., chairman of the entertainment committee for the club; and master of ceremonies was **William Franke,** Mexican Petroleum Co. **Ned F. Foulds,** Washington, chief of OPC's fuel oil section and **E. E. Overton,** District 2 marketing director, were among guests at the party.

Members of the Wisconsin Petroleum Assn.'s golf team were **David Wilson, Jr.,** and **Alfred Breuch,** both of Pennsylvania Oil Co., Madison; **Mel Teige,** Stoughton, Wisconsin Petroleum Co.; **Harry B. McGaughey,** Racine, W. H. Pugh Oil Co.; **R. C. Brown, III,** Oshkosh, Cook and Brown Oil Co.; and **Edward Anderson,** Racine, Racine Fuel Co. Those representing Chicago Oil Men Club were **Mel Keim,** Apex Motor Fuel Co., **William Franke,** Mexican Petroleum Co.; **Mel C. Hill,** Johnson Oil Co.; **Wilson Henry,** Valvoline Oil Co.; **"Tiny" Forsberg,** George N. Olson; and **Holger Jensen,** Jensen Petroleum Co. (See photos below.)

Competitors in the Chicago Oil Mens golf tournament shown here are left to right: Messrs. Franke, Forsberg, Tiege, McGaughey, Foulds—who served as caddy for one of the foursomes—Keim, Wilson, Hill, Brown, Moore and Roy J. Thompson, of Apex Motor Fuel Co.

REDUCE

LONG-DISTANCE CALLS

How many times have you run-up a long distance telephone bill since the OPA Price Schedule #88 went into effect? How many times have you wondered whether you were getting the maximum ceiling price for all your petroleum products?

How many times have you wondered if subsequent amendments didn't make it possible for you to advance some of your prices?

There is no need for you to wonder about any oil order—whether from the JUSTICE DEPARTMENT, MARITIME COMMISSION, OFFICE OF EXPORT CONTROL, OPC, OPA, WPB, or ODT—because with a subscription to Oil-LAW-Gram you can have the verbatim texts of all oil orders and amendments since August 14, 1941. These reports come to you filed in a handy 3-ring binder and indexed for immediate reference to any order.

For instance, you will find Price Schedule #88 and immediately following you will find its subsequent amendments.

When we say "you'll find an order" we mean you will have before you the text of the order, word-for-word, comma-for-comma, exactly as written.

Oil-LAW-Gram sends subscribers the word-for-word texts of oil orders usually within 36 hours after the order's issuance in Washington. That's why Oil-LAW-Gram subscribers can take advantage of the full latitude the order provides . . . that's why Oil-LAW-Gram subscribers know exactly what they can do and what they cannot do without having to make frenzied long distance telephone calls.

Carrying out the Baruch Rubber Recommendations will call for a real flurry of new oil orders . . . quickly passed and quick to become effective. Protect yourself now with Oil-LAW-Gram. But try before you buy. Take advantage of a 2-week free trial to Oil-LAW-Gram by clipping and mailing the coupon below.

Clip and mail this coupon now!

Platt's Oilgram
5th Floor Penton Bldg.
Cleveland, Ohio

Please send me a two weeks' trial of Oilgram News. It is understood that this incurs no obligation or expense on my part.

Company Name .....

Address .....

City ..... State .....

My Name .....

My Title .....

SEASONED VETERANS

In stations all across the country, Gilbarco pumps are today giving the unfailing service for which they have become famous. Some of them are veterans—others new Gilbarco Model 96 Calco-Meters. But all feature absolute dependability.

Keep that in mind if you are replacing old pumps. If they are nine years old or older, or if damaged beyond economical repair, or their installation is proven necessary and appropriate in the public interest and to promote the war effort—replace them with the "Million Gallon Pump." Made by the machines and men that are today turning out intricate implements of war, these pumps stand on their fine service record!

"We recently replaced our old Gilbert & Barker computers (which had dispensed over two million gallons each at the only expense of new belts for the motor and new hoses) with six new Model 96 Easy Reach Calco-Meters. We are more than convinced that Gilbert & Barker equipment is the best investment anyone can make."

F. E. PICKETT
F. T. & F. E. Pickett
3954 West Olympic Blvd.
Los Angeles, Calif.

YOURS FOR YEARS!

Gilbarco

17TH YEAR IN BUSINESS

4TH YEAR IN WAR WORK

GILBERT & BARKER MANUFACTURING CO. • WEST SPRINGFIELD, MASS. • TORONTO, CANADA

ECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

Monthly Technical Section Devoted to
REFINERY MANAGEMENT and PETROLEUM CHEMICAL TECHNOLOGY

Volume 34 | September 30, 1942 | Number 39

PUBLIC LIBRARY NOV 4 1942

'Making More With Less'---Refining's Big Job in War

Designing to Save Valves: How and Where to Cut

Survey shows requirements ranging from 44 to 171 tons of valves per 1000 b/d of 100-octane gasoline to be produced, so it's a ripe field for designers with an eye on critical materials....R-295

29 Places to Save Materials In Refinery Construction

Emergency minimum specifications adopted by Shell Oil Co., Inc., point the way to 29 specific substitutions for critical materials, comparing new and old standards.....R-297

Plastics Have Wartime Role In Today's Refineries

They replace metal tubing under certain conditions; have other applications including protective coatings for pipe and lining for storage tanks R-301

Gasoline Plant Corrosion: Its Nature and Control

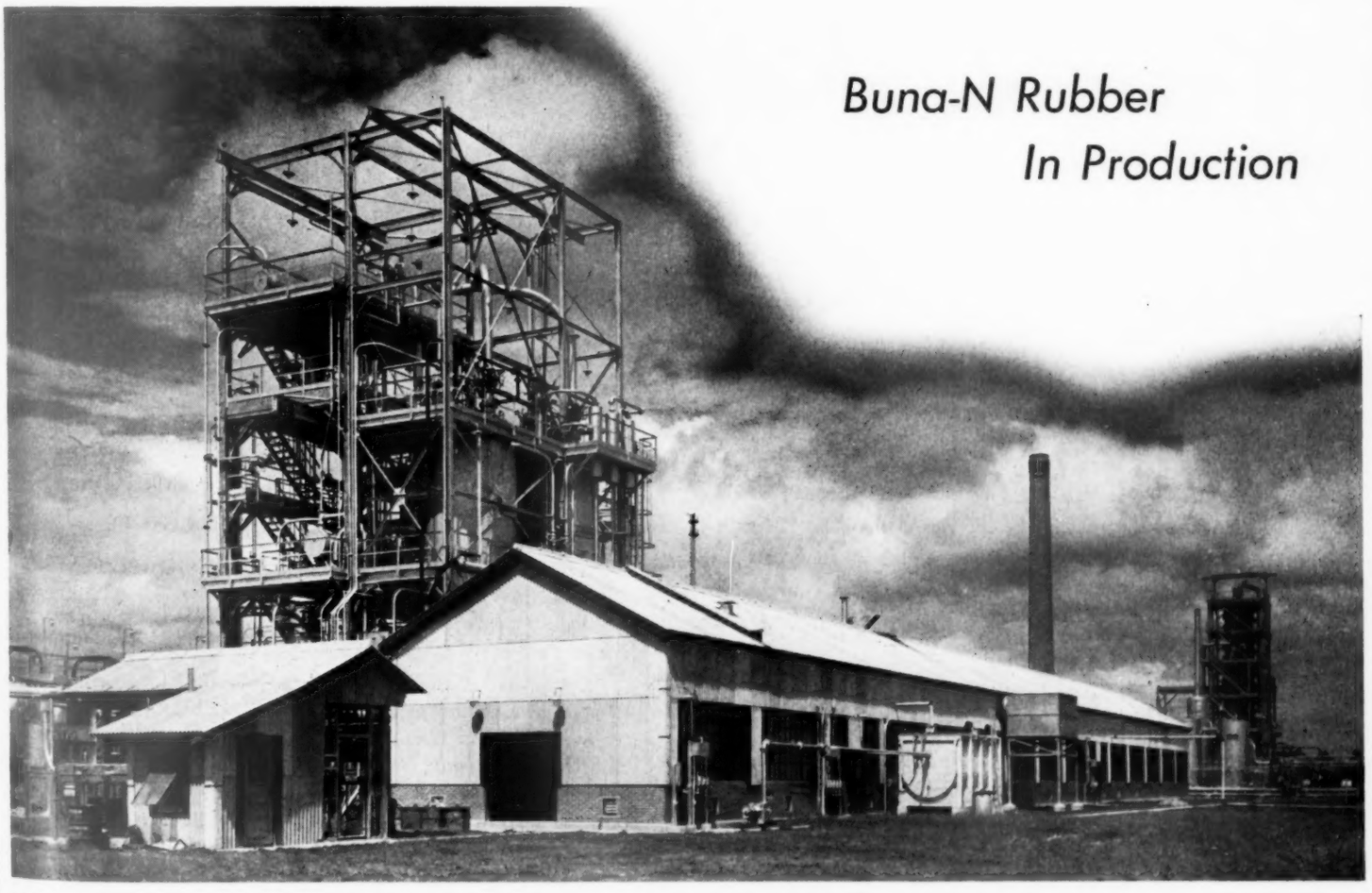
Types of corrosion commonly encountered and the behavior of various materials in withstanding corrosion of various equipment in natural gasoline plants are discussed R-308

Butadiene Yields and Costs By New Houdry Process

The new Houdry two-stage process for production of butadiene, using butane as a raw material, is discussed from the economic standpoint..R-305

New Research Data Will Aid Conserving in Plant Design

Investigations reported by petroleum chemists at the meeting of the American Chemical Society provide information that will help engineers in constructing more efficient towers, stabilizers and other equipment for new processes.....R-318



This commercial rubber plant of Standard Oil Co. of Louisiana was completed in March, 1941, and began production of 5 tons daily of Buna-N type synthetic rubber. The plant was enlarged in March, 1942, and now produces 10 tons per day. Buna-S can also be manufactured by this plant

Dr. C. L. Brown

Dr. R. E. Burk

Dr. L. M. Henderson

New Officers of A.C.S. Petroleum Chemistry Division

THESE three men will be at the helm for the petroleum chemists of the American Chemical Society, as the research men of the oil industry as well as of all industries rise to their greatest challenge of all time—finding the substitutes and the new and improved materials that will make the nation invincible in its war effort. The new officers were elected at the meeting of the division Sept. 10 at Buffalo, during the regular fall convention of the society, which was largely given over to reports on wartime research activities.

Dr. Cecil Langford Brown, chairman of the Petroleum Chemistry Division, is director of research and development for the Standard Oil Co. of Louisiana, Baton Rouge. He has been associated with research and pilot plant operations leading to commercial developments in the fields of hydrogenation, chemical derivatives of petroleum, alkylation, catalytic reforming, catalytic cracking, synthetic rubber and synthetic rubber raw materials. Following a period as a university science teacher, he went to work as a research chemist for the Standard of Louisiana in 1929. He received his master's degree from the University of Missouri and his doctor's degree from Brown University.

Dr. Robert E. Burk, vice-chairman, is director of research for the Standard Oil Co. of Ohio, Cleveland, and also is a professor of chemistry in the graduate school of Western Reserve University, where he joined the teaching staff in 1928. He is chairman of the committee on catalysis of the National Research Council, and is a Lieutenant Commander in the U. S. Naval Reserve. He received his master's degree from Harvard and his doctor's degree from Oxford University, England, where he was a Rhodes scholar.

Dr. Louis M. Henderson, secretary of the A.C.S. petroleum division, is supervisor of research for Pure Oil Co. and is located at its laboratory in Winnetka, Ill. He has been chairman of the Philadelphia section of the American Chemical Society and is now active in the Chicago section. He was Chief Gas Officer of the 86th Division during World War I. After completing graduate study in chemistry at the University of Chicago, he taught chemistry at the University of Minnesota and left there in 1924 to join the research laboratory of the Atlantic Refining Co., later becoming affiliated with Pure Oil Co.

REFINERY MANAGEMENT *and* PETROLEUM CHEMICAL TECHNOLOGY

September 30, 1942
Volume 34
Number 39

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

094.1
739.22

Reduce Valve Requirements in Designing Wartime Plants, Refiners are Told

IN designing wartime refineries, the need to provide for all practicable elimination of steel valves has been called to the attention of oil companies by Max B. Miller, chief of the construction section, Refining Division, of the Office of Petroleum Coordinator for War. Suggestions for conserving valves have also been included in the emergency modifications of wartime plant design adopted by some oil companies.

The demand for valves and fittings for all types of war plants greatly exceeds the number which manufacturers are able to turn out, it is said, even though simplifications in valve manufacture have been adopted that will provide the equivalent of a 10% increase in production. Valve requirements are larger in the aviation gasoline, butadiene and other new gas processing plants the oil companies are building than in older plants. Therefore, the OPC refining division is urging the elimination of steel valves wherever possible in plant design in order to avoid later bottlenecks in securing supplies as the plants are built.

That opportunities exist for plant designers to reduce the number of valves required is cited by Mr. Miller, based on an analysis of material lists covering aviation gasoline projects. This showed requirements ranging from 44 tons to 171 tons of valves per 1000 b/d of 100-octane gasoline to be produced. Where requirements were high, it was found that the plants were being designed in accordance with pre-war practice.

Survey of Valve Needs Urged

Refiners for whom new plants are being planned are urged by Mr. Miller to make a careful survey of valve requirements in connection with every project. The following suggestions have been offered by his construction section as conserving on steel valves used in new plants:

"1. The shortage is in steel valves only. Cast iron valves are readily available. The use of cast iron valves wherever possible is recommended.

"2. Plug cocks can often be substituted for valves.

"3. Eliminate valves at towers which are installed solely to allow for the testing of lines prior to starting up units after shutdowns. These can be replaced with figure 8 flanges.

"4. The practice of using double block valves can be reduced except in special cases, such as where extremely volatile hydrocarbon lines need to be shut off where contamination between two different lines may result due to leakage.

"5. Where control valves are equipped with bypasses, it is now the usual practice to place a block valve on either side of such control valves. One of these block valves could be eliminated, as general safety requirements do not permit the removal of control valves for repair while units are on stream. One valve would be sufficient to shut off the flow through the control valves, should the operating mechanism fail to function.

"6. On short pump suction lines (40 ft. or less) from towers, the practice requiring one valve at the pump and one at the tower could be changed to eliminate one of these two valves. Also, the requirement of block valves at steam and exhaust headers for branch lines where duplicate valves are now installed directly at prime movers could be eliminated, saving an additional valve.

"7. The simplification of manifold installations will save valves no end.

"8. Where steam driven pumps are manifolded there is usually a gate valve on the main steam line and both a gate valve and a globe valve on each branch line. The gate valves on the branch line can generally be eliminated. The globe valve may leak a little if one of the pumps is shut down but can always be repaired on general shut down.

"9. Where heat exchangers are bypassed for control purposes only one of the fluids need be bypassed.

"10. Salvage valves. When lines are abandoned, the block valve is often left attached to the end of the live portion of the line. This valve can be removed during the first general shut down and replaced with a blind flange. Large numbers of valves can usually be picked up from gathering lines and field properties. Valve parts can be secured more easily than complete valves."

In its instructions to engineering staffs for the curtailed use of critical materials in designing plants, the manufacturing department of Shell Oil Co., Inc., has called attention particularly to the need for the design and arrangements of all projects to require the minimum of steel valves. Among these instructions are:

"(a) Cast iron valves shall be used instead of steel wherever possible, as covered in detail by references to modification of the Shell Piping Specification.

"(b) Plug cocks may be substituted for valves wherever cocks are suitable. At control valve installations where a bypass is used, two 3-way, 3-port cocks can be substituted for two gate and one glove valve provided that there is another valve elsewhere in the line that can be used for throttling control.

"(c) Eliminate all valves not required for operating control unless such elimination will increase operating hazards to a degree not commensurate with the saving effected. For example, valves at columns installed solely to allow for testing lines prior to starting units after shutdowns can be replaced with figure 8 blinds, while the practice of installing a valve at each end of pump suction lines serving columns, accumulators, etc., can be changed to eliminate one valve. The advisability of such elimination must be based on considerations of line length, number of joints between vessel and pump, number of pumps served by one line, pressure, temperature, product handled, etc. Block valves on branch lines at steam and exhaust headers can be omitted since valves always are installed at the prime movers served.

"See the attached print (Fig. 1) for illustration of the extent of valve elimination contemplated.

"(d) The practice of using double block valves with a bleeder between shall be con-

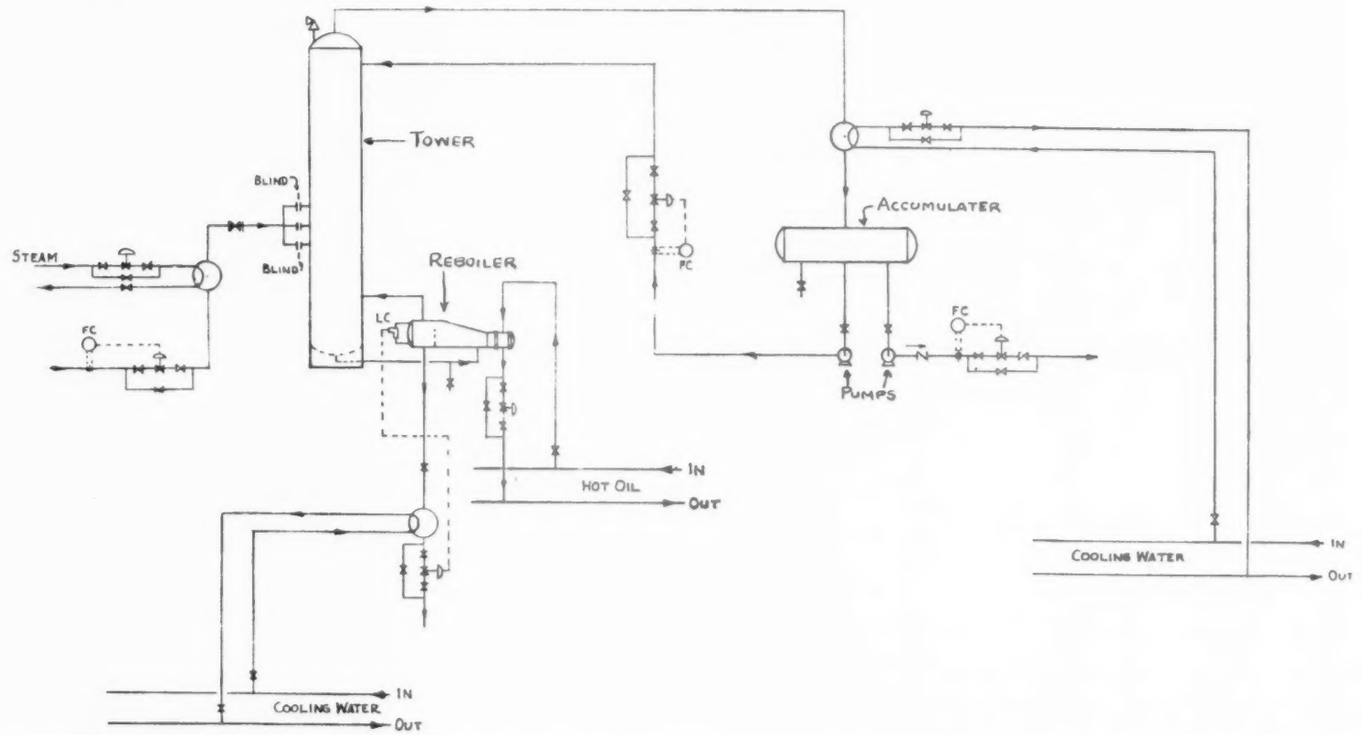


Fig. 1—Illustrations of possible valve eliminations in plant design are shown on a diagram of the valve system for a typical flow chart supplied by Shell Oil Co., Inc., to its refinery staffs, together with instructions on how to conserve on this equipment in laying out a new plant. Blinds in place of valves are shown in the separate feed lines into the tower and single valves on the suction lines from the pumps to the accumulator and at other points where in normal practice additional valves would be installed

fined to special cases where a positive shutoff or absolute certainty of freedom from contamination must be assured."

Steel valves within the pressure-temperature range of either steel or cast iron valves are to be used in gas and oil service in hazardous process areas only, Standard Oil Co. of Calif. has instructed its engineering staff. Also, in designing new units, steel valves are to be used only for the first valve connecting to towers, stills, boiler headers, tanks, and other vessels where large quantities of stock or vapors would be released due to failure from fire, earthquake or bombing.

Other suggestions for the conservation of this item of refinery equipment are given in this company's requirements for wartime construction and maintenance as follows:

Construction Requirements Altered

"Steel valves 150-lb. series, pressure-temperature rating shall be increased to values on the American Standards Assn. chart along a straight line connecting 300 lbs. at 100 deg. F. and 150 lbs. at 750 deg. F.

"Steel flanged valves and fittings shall be 1-16 in. raised face in 150-lb. and 300-lb. series at temperatures below 500 deg. F. Above 500 deg. F. and for 400-lb. series and higher, use A.S.A. small tongue and groove facing, except in sizes 14-in. and larger use A.S.A. octagonal ring joints.

"Bolting, for raised face flanges shall be carbon steel bolts, for tongue and groove and ring joints alloy steel stud bolts conforming to Spec. 9.

"Cast iron valves shall be used in all services below 350 deg. F., within the rating of cast iron valves, including process equipment not immediately adjacent to a source of ignition and where not excepted in 5th paragraph above.

"Cast iron valves shall be used in all steam services within the rating of cast iron valves, except in mains and at connections to major branch lines.

"Brass bodied valves shall not be used in any service except where required for corrosion resistance. For water, steam, air, etc., use cast iron bodies with appropriate trim.

"Valve stems in oil and gas lines shall be steel, to resist failure by melting during fires, unless a more corrosion resistant material is definitely required. Consider chrome-plated steel, instead of stainless steel or Monel where corrosion resistance is necessary.

"Rising stem, outside screw and yoke type valves are preferred, but substitution of non-rising steam valves should be considered where these are available. In sizes below 2-in., inside screw valves are generally preferred because corrosive atmosphere severely attacks the fine threads on the outside screw and yoke type.

"Gage and meter leads, sample lines, and all connections to process equipment 1-in. and smaller, shall be extra heavy as far as the first valve. Threaded connections, except to cast iron equipment, shall be seal welded as far as the first valve in all services where leakage is a hazard, such as volatile oils or corrosive or hazardous chemicals, or in any service over 100 p.s.i. or 350 deg. F.

"Welded construction in line sizes 2-in. and over is preferred for all installations and is required in all new process lines in sizes 3-in. and larger. Use flanges only at connections and where required for inspection or blinding. Use slip-on flanges for 150-lb. and 300-lb. series and welding neck flanges for higher ratings. Use welded fittings, bends, mitre joints, tube turns, etc., in preference to flanged fittings.

"Pipe bends of standard radius up to and including 6-in. size shall be used where piping arrangement permits; above 6-in., use double mitre welded ells. When short radius ells are required, use double mitred ells in sizes 4-in. and larger, except in special cases where pressure drop is critical. In sizes smaller than 4-in., use of tube turns is optional since the added cost over double mitred bends is small.

"Bypasses around control valves shall be omitted in all services below 350 deg. F. unless specifically excepted. Use one block valve in series with the control valve.

"Double blocks and bleeders shall not be used unless specifically approved. Consider use of plug cocks instead.

"One valve only shall be used in branch steam lines."

Standard Oil Co. of California's instructions call for the use of lap-welded pipe instead of seamless pipe at temperatures below 500 deg. F. Flash-welded or arc-welded pipe of gold quality can be considered the equivalent of lap-welded pipe. Use second-hand or light weight pipe when available and service permits, the instructions state.

29 Places to Save Critical Materials In Building Wartime Refineries

AmPA ★ WAR REFINING ARTICLE

SPECIFIC instructions for the conservation of refinery materials and equipment in wartime plant construction and modification are set forth by the Shell Oil Co., Inc., in its "Wartime Minimum Construction Standards". For greater practical use by its refinery staffs, the guide has been prepared in condensed form, in which, item by item, wartime standards are compared with former normal practice.

This guide, which is published below, carries definite limitations on materials for 29 items, including features of plant construction and such equipment as heaters, pressure vessels, fractionators, condensers, piping, heat exchangers, storage tanks, etc. Substitute materials are listed or methods of design and construction given which the company finds will give minimum standards acceptable in its plant building program under wartime conditions. The standards are drawn up on the basis that replaceable parts such as furnace tubes, will last only three years, as has been requested by the War Production Board, compared with a normal life of 5 to 10 years under former practice.

In the country's interest and toward furtherance of the war effort, all company workers have been asked by the Shell management to attempt the greatest possible economy of materials, not only in future construction projects but also in plants now under way, by seeking eliminations possible through the modification of normal design.

"Wherever possible, previously designed plants or equipment should be adapted to current requirements in the interest of savings in engineering effort and construction time," states the company's general instructions for the curtailed use of critical materials.

"Previously established construction standards involving such factors as convenience must be relaxed. Normal practices must be discarded and each step in design carefully considered in order that minimum design factors may be adopted for the duration.

"The design and arrangement of all projects shall be examined carefully to determine that arrangement requiring a minimum of steel and other critical materials. For instance, initially it was planned that the fractionation system and the feed preparation system of the catalytic cracking project should have overhead piping requiring extensive structural steelwork. It has been decided that accumulators and reboilers will be installed at ground level and condensers will be elevated only sufficiently to allow rundown streams to gravitate to accumulators. In this case it is preferred to have all lines in trenches. Where necessary for conservation of space, discharge lines may be supported on a structure above the pumps."

Where several contractors work concurrently on the same project in the same area, the company emphasizes that it is important that they cooperate closely in minimizing construction effort by the joint use of pile driving equipment, rigging equipment, and so on.

The specifying of spare equipment should be held to the absolute minimum. "Specifically, no spare tubular elements for heat exchanger equipment shall be purchased," states the company's instructions, "inasmuch as it is expected that initial failure could be repaired by plugging of tubes and the exchanger could thus be operated over a sufficient period thereafter to permit procuring a spare bundle.

"In the selection of spare units for pumping installations, every effort should be made to have one spare unit serve as many units as possible. The number of spares should be the absolute minimum necessary to guarantee uninterrupted operation. In some cases it may be possible to obviate the installation of a spare unit by maintaining in stock a spare rotating assembly for all units which would otherwise require a spare."

Before any material is purchased for any installation, every effort is to be made to supply salvaged material in stock, or any material which could be salvaged from operating units within the refinery. Salvaged tanks are occasionally found available from outside sources, the Shell Oil Co. manufacturing department states, and although it has been found that such tanks ordinarily cost slightly more than new tanks, the availability of the steel from that source warrants a discussion of each individual purchase as a separate case.

The company's specific limitations on refinery material, as contained in its Wartime Minimum Construction Standards, are as follows:

Wartime Minimum Refining Construction Standards

Issued by Shell Oil Co., Inc.

ITEM	NORMAL PRACTICE	WARTIME STANDARDS
1—Foundations		
Reinforcing steel	Used as required on basis of economic balance between steel and concrete	Minimize use of steel by increasing use of concrete. Employ mass concrete when possible.
Piling	Creosoted — 12 lb. treat.	Creosoted — 6 lb. or $ZnCl_2$, Wolman or Chemonite salt treatment. Untreated piles may be infested before driving or before pouring concrete.
2—Paving—Process Areas	Concrete—reinforced	Concrete—unreinforced.
3—Trench Covers	Steel plate or grating	Wood grating — only where required for passage or access. Wood shall be treated by $ZnCl_2$, Wolman or Chemonite salt process.
4—Equipment Supports		
Ground level	Steel saddles on concrete.	Concrete saddles.
Elevated	Structural steel	Reinforced concrete. Minimize elevated construction.
5—Stairways		Minimize stairways—extend use of ladders.
Stringers	Steel	Wood.
Treads	Steel grating	Wood plank or grating.
Handrails	Steel pipe	Wood.
6—Ladders		
Rails	Steel	Steel if over 12′ high—Wood 12′ and under.
Rungs	Steel	Steel.
Cages	Steel—Ladders over 12′ high	Omit—Arrange ladder to climb between ladder and vessel, as on fractionating columns.
7—Platforms	Used wherever desirable for operating necessity and convenience and facilitating maintenance	Use only where absolutely necessary for operating requirements. See under "Fractionating Columns" and "Heaters", below.
Framing	Structural Steel	Wood or Reinforced concrete.

ITEM	NORMAL PRACTICE	WARTIME STANDARDS
8—Trolley Rails	Steel used extensively	Omit—Use temporary or portable facilities.
9—Hoisting Davits	do.	do.
10—Buildings		
Framing	Steel	Wood.
Sheathing	Core. Galv. Steel or Transite	Transite or Stucco.
Sash & Doors	Steel	Wood. Provide plywood blackout blinds for installation when required and light locks on doorways.
Flooring	Steel plate or grating	Wood plank or grating.
Toeboards	Steel	Wood—1″ x 6″.
Handrails	Steel pipe	Wood.
11—Heaters—Cracking		
Setting	Steel cased or brick	Brick only.
Tubes	Seamless. Usually alloy steel for 5-10 year life.	Seamless, Use alloy steel only to extent necessary to provide life of 2-3 year. Tube materials shall be selected from the following list, which has been designated as the wartime standard list by WPB:— 1. Low carbon steel. 2. Low carbon steel with 0.5% moly. 3. 2-3% chrome steel with 0.5% moly. 4. 4-6% chrome steel with 0.5% moly. 5. 7-9% chrome steel with 0.5% moly. 6. 18% chrome, 8% nickel stainless steel.
Headers	Cast Steel. Usually alloy steel for 5-10 year life.	Cast Steel. Use alloy steel only to extent necessary to provide life of 2-3 years.
Tube Supports	High alloy cast steel.	Low alloy cast steel, or alloy cast iron for 2-3 years maximum life. WPB order M-21-g applies.
Platforms	Steel. Provided for operation, inspection and maintenance.	Steel. Install only to minimum extent required for firing control. None for inspection and tube removal.
Trolley Rails	Steel for tube handling.	Omit, Use temporary or portable facilities.
Stacks	Self-supporting steel, natural draft.	Concrete. Natural draft, or short self-supporting steel with artificial draft. The WPB has prohibited use of natural draft steel stacks on boilers, and consideration should be given to similar voluntary action for heater stacks.
12—Heaters-Fractionating Unit or Circulating Oil	Same as "Heaters, cracking".	Same as "Heaters, Cracking", except:—
Tubes	Seamless carbon steel pipe, A.S.T.M. Spec. A106.	Lapwelded carbon Steel pipe, API. Spec. 5L, or Electric Resistance welded carbon steel pipe A.S.M. Spec. A135.
Headers	Cast Carbon Steel	Welded steel return bends one end, flanged return bends or cast carbon steel headers other end to permit cleaning. Welded steel return bends both ends where need for cleaning improbable, as on circulating oil heaters and direct fired reboilers.
13—Pressure Vessels		
Code	A.P.I.—A.S.M.E.	A.P.I.-A.S.M.E., Consider spherical vessels which require minimum steel per unit volume.
Material	Carbon Steel, ASTM Spec. A70, Flange or Firebox Quality.	Strip mill plate up to ¾″ thickness for maximum temperature of 650°F. Universal mill plate up to ¾″ thickness without temperature limit if meets bend test requirement of A.S.T.M. Spec. A70. A.S.T.M. A70 plate for greater thicknesses, and higher temperatures.
Head Design	Seamless ellipsoidal	Ellipsoidal, dished or hemispherical, seamless or fabricated.
Nozzles & Manways	Taylor forged steel	Forged or Cast Steel. (A.S.T.M. A215, Grade A3W) or built-up.
Stress Rel. & X-ray	Stress relief as required by Code. X-Ray infrequent.	Stress relief as required by Code. It is possible to reduce usage of steel by stress relieving and x-raying, when not required by Code, provided that delays in required delivery will not result therefrom.
Supports—Horizontal	Welded or cast steel or cast iron saddles on concrete or structural steel foundation.	Steel bearing plate welded to vessel. carried in concrete saddle.
Supports—Vertical	Welded steel skirt or steel legs.	Short steel skirt, legs or clips on concrete ring. Height of concrete ring and length of skirt or legs must be balanced for minimum steel usage. Spherical vessels require special treatment depending on size.
14—Fractionating Columns	Same as "Pressure Vessels," except:	Same as "Pressure Vessels", except:—
Heads	Same.	Same. Flanged heads prohibited by WPB.
Platforms	Segmental at control valves, full circular at top.	None — prohibited by WPB. Clips for future platforms may be installed.
Manhole Cover Supports	Hinged, or davits.	Hinged. Use of davits prohibited by WPB.
Hoisting Davits	One at top each column.	Omit. Use temporary facilities.
Feed Valves	One at each inlet.	Omit. Use flanges with figure 8 blinds.

ITEM	NORMAL PRACTICE	WARTIME STANDARDS
Sample Conns.	As desired.	Not more than at every fourth plate.
Thermowells	As desired.	do.
Bottom surge capacity	Separate accumulator.	Build into column bottom whenever overall use of steel will be reduced thereby.
15—Accumulators	See "Pressure Vessels"	See "Pressure Vessels" & "Fractionating Cols."
Size related to flow	Variable — no fixed practice.	Maximum capacity equal to 15 minutes at normal flow rate.
16—Tanks—Oil	A.P.I. Std. 12-C, welded, with bottom angle. Mfgrs. option on lapwelded construction.	Light Oils:—Steel, A.P.I: Std. 12-C; without bottom angle, butt welded construction in all sizes. Stairways must be wood. Heavy oils:—Prestressed concrete, with wood or concrete roof. Consider use of meters to avoid need of rundown tanks.
Tanks—Water	Usually steel, same as for oil. Wood occasionally.	Wood. Use of steel for water tanks prohibited by WPB.
17—Heat Exchangers	Same as "Pressure Vessels", plus:	Same as "Pressure Vessels", plus:
Channels	Cast or fabricated steel.	Cast Iron to 350°F.—Cast or fabricated Steel over 350°F. Pressure-temperature relationships in accord with Piping Standards.
Channel Covers	Steel.	do.
Floating Heads	Steel	Cast Iron to 350°F. Steel over 350°F.
Tubes	Carbon or alloy Steel, or nonferrous for maximum economic service life.	Steel only, minimize use of alloy steel, to provide maximum life of 2-3 yrs. Tubes ¾″ OD, 16 Ga., 155″ long, except that tubes 192″ long may be used to avoid excessive exchanger diameters.
Tube Sheets	Carbon or Alloy Steel or Non-ferrous, 1½″ minimum thickness.	Carbon Steel only, 1½″ minimum thickness.
Bypass Valves	Usually both fluids each unit.	None, except in special individual cases.
18—Condensers	Same as "Pressure Vessels," plus:	Same as "Pressure Vessels", plus:
Channels	Cast Steel	Cast Iron.
Channel Covers	Steel	Cast Iron.
Floating Heads	Bronze	Bronze.
Tubes	Non-ferrous, usually inhibited admiralty. Bi-metallic in some cases.	Inhibited admiralty, except that if product side prevents use of non-ferrous tubes, carbon steel shall be used with red lead coating (Du Pont Dulux No. 67-723) on water side. No bi-metallic tubes. Tube size and length as for "Heat Exchangers".
Tube Sheets	Muntz—1½″ minimum thickness.	Carbon Steel—1½″ minimum thickness. If water conditions justify, water side may be bronze coated by fusion welding.
19—Coolers	Same as "Condensers"	Same as "Condensers", except:—
Tubes		Carbon steel, red leaded inside.
Tube Sheets		Carbon Steel—1½″ minimum thickness, red leaded on water side.
20—Cooling Towers		
Type	Forced draft.	Unless prevented by space limitations, atmospheric, which employs less critical material than forced draft type.
Hardware	Copper & Bronze.	Galvanized steel.
Basin	Deep, frequently suction pit depth over entire area.	Shallow, minimum depth, with minimum size suction pit, to save reinforcing steel.
21—Pumps—Process		
Casings	Cast Steel, alloy cast iron when resistance to corrosion is controlling factor.	Cast Iron to 200 psi and 300°F. Cast Steel for higher pressures and temperatures. Minimum use of alloy materials.
Impellers	do.	Cast iron to 450°F., Cast steel above 450°F. Minimum use of alloy materials.
Trim	Stainless Steel.	Carbon Steel, unless alloy materials required by corrosive service.
22—Pumps—Transfer	C. I. Casing, C. I. or Bronze impeller, Stainless steel or Bronze Trim.	C.I. casing and impeller, Carbon steel, C.I. or Bronze Trim.
23—Pumps—Water	C. I. Casing, Bronze impeller and trim.	C.I. Casing, Bronze impeller & trim.
24—Compressors	Purchase new 4-cycle units to meet individual job requirements.	Utilize used compressors from whatever source available. Purchase of new compressors is on a strict basis of allocation by WPB, since there is a shortage of manufacturing capacity, particularly in units of 300 HP and larger. Give preference to two cycle units, which minimize foundation requirements.
25—Piping	Conforming to Shell Specification S-1. Service Group I for oil process piping.	Except for tank, vessel and accumulator drain valves, which must be steel, use Service Group III of Specification S-I for oil process piping, which permits use of Cast Iron valves for the lower ranges of pressure and temperature. The WPB recommends limiting 150 lb. A.S.A. Standard steel valves and fittings to a maximum temperature of 500°F. The "Service Range" chart of Spec. S-I has been changed to conform, and revised prints thereof are attached as Appendix D. Minimize use of forged steel fittings by welding all lines 1½″ and larger, and employ bends for direction changes to maximum extent possible. Cast steel flanges of welding quality (A.S.T.M. Spec. A215-4, Grade A3W) may be substituted for forged steel flanges.

ITEM	NORMAL PRACTICE	WARTIME STANDARDS
		Non-metallic pipe must be used for large water lines. Soil pipe must be non-metallic outside buildings.
26—Electrical		
Type wiring	Conduit.	Use open wiring wherever possible.
Switchgear	Standard Type—Housed.	Outdoor, weatherproof type. Eliminate switch houses.
Lighting Fixtures	Vapor tight or explosion proof.	Standard type, except where explosion proof are required by State Electrical Safety Orders. The use of floodlights is prohibited.
Motors	Explosion proof—Class I Group D	Class I Group D where required, and for all other locations when available. Class II Group G, or open splashproof may be substituted if necessary when permitted.
Motor Control	Standard Type—Housed	Outdoor weatherproof type wherever possible. Eliminate switch houses.
Lighting Voltage	115-230 V, 3 Wire, 1 phase.	115-230V, 3 wire, 1 phase.
Power Voltage	440 V, 3 phase.	440 V, 3 phase, up to & including 125 HP. 2300 V, 3 phase. 150 HP and larger. Smaller motors in an area in which 2300 V is serving larger motors. Should be 2300 V also for simplification of electrical installation.
27—Instruments	Installed for a high degree of precision and convenience and close economic approach to full automatic control. Specications of Motor valves follow Piping Specification S-1. Instruments centralized in a control house.	WPB Limitation Order L-134 controls instrument & motor valve construction. Application of instruments must be reviewed carefully to insure that there is adequate justification for every instrument installed. In some cases, instruments may be grouped in simple shelters, at several points in an operating area and avoid the installation of a large central control house.
28—Insulation	Principally 85% Magnesia, metal covered on piping in process areas. Cork used for refrigeration.	Minimize use of 85% Magnesia, by substituting most available of other commercial materials. 85% Magnesia prohibited under 212°F. Metal covering prohibited. Cork substitutes must be used for refrigeration.
29—Painting		
Surface Preparation	Tanks, sandblast. Structural, wire brush.	Tanks, sandblast. Structural, wire brush
Primer	Two coats Red Lead.	Two Coats Red Lead on steel; white lead in oil, 2 coats, on wood.
Finish	One coat Aluminum.	Gray, or camouflage colors as required by Army. Paints must be lead free for refinery exposures.

Treat Steel Tanks Handling Salt Water Or Weak Acid with Enamel Coatings

In the present shortage of many construction materials, it has become necessary for some refiners to use steel and iron parts in salt water services where brass, Monel, lead, rubber and other materials were formerly employed. Under these conditions a short life is to be expected for these substitute materials. Standard Oil Co. of Calif., however, has experimented with the use of baked enamel coatings for the protection of some iron and steel equipment handling corrosive waters or weak acid solutions.

Normally, the cost of these coatings might not justify their general use to any great extent, stated a report of the company's materials laboratory; however, it now appears worthwhile to consider their increased use where the preservation of existing equipment is essential. It was recommended that these coatings be applied to iron and steel parts subject to corrosion by salt water and weak acid solutions when the general operating temperature does not exceed 200 deg. F.

"These coatings are well beyond the experimental stage and they have been used successfully on steel tanks in the beverage industry for a number of years", stated the report. "A considerable number of iron and steel condenser heads and channel sections at the Richmond refinery subject to salt water corrosion have recently been coated." The company is also using these coatings for a number of filter vessels and weak sulfuric acid tanks.

The coatings are applied by the manufacturers or by experienced contractors, who prefer to coat the equipment in their own shops, where they have facilities for cleaning the surface and baking ovens. Some are equipped for sandblasting and baking in the field, however. The baking temperature varies between 275 deg. and 400 deg. F., depending on the surface and the coating used. The oil company states that all material submitted for coating should have pits welded up and ground smooth, to do away with sharp edges which might result in early coating failure.

The cost varies with the contractor and the job, it was said, being about $1 per sq. ft. on channel sections and small tank interiors at one refinery. Four or 5 coatings of the enamel are generally applied for corrosive services.

In describing its experiments with two of these coatings, the company said that one had had long life in steel tanks and vats in the beverage industry; samples tested were unaffected after long exposure to boiling sea water and to 5% sulfuric acid at 120 deg. F. Steel panels coated with another enamel were in good condition after a year's exposure in light oil tankers, where they were subject to sea water and gasoline. In a laboratory test the coating was unaffected by exposure to boiling sea water.

Wood vs. Steel Stairs In Refinery Design

The conditions under which wood walks and stairs can be substituted for steel in refinery design and construction are set forth in the requirements for wartime construction and maintenance of the Manufacturing Department of the Standard Oil Co. of California. On this means for the conservation of steel, the emergency standards state:

"In the past steel for walks and stairs has been used for

"(a) Prevention of serious fire hazards.

"(b) Durability and low maintenance with some incidental reduction in fire risk.

"For the duration it is intended that steel should still be used in operating plants which handle hot and/or volatile stocks, with nearby sources of ignition. This covers practically all of the process areas of the newer plants with fired heaters, or which handle stocks which may flash at the operating temperature.

"Under practically all other conditions such as tank stairs, manifolds and refinery equipment operating at reduced or atmospheric temperatures remote from ignition sources, wood should be used.

"No attempt should be made to correct existing inconsistencies such as wood walks and stairs around the crude stills which should be maintained in kind or the elimination of steel stairways on tankage which has already been fabricated."

Plastics Used as Substitute Materials In Wartime Refinery Maintenance

SYNTHETIC plastics are fast becoming wartime substitutes for critical materials which the refinery operator may well study for use in plant construction and maintenance. Naturally, not all the synthetic plastics can be considered substitutes for materials in which war demand has produced acute shortages. Some of them are among the critical materials themselves, because of superior qualities for certain uses.

In general, however, plastics have been finding more diversified use in industry as their qualities improve through better manufacturing methods and as experience in their practical application shows the uses to which they can be put.

In some cases, present prices for plastics are at a level which would preclude entirely their adoption under normal conditions; but many authorities believe their cost later may be so reduced that they will come into greater use for purely natural economic reasons.

The term synthetic plastics, or plastics alone, has come to be applied to synthetic compositions or products of organic origin which can be molded by heat or pressure, or both. Many of the synthetic plastics are made from raw materials having petroleum as one of their sources.

Some plastics have a few or many of the characteristics of natural rubber; others follow more nearly the characteristics of glasses. Some of them may be molded by the use of pressure alone into whatever form is desired; others require heat; some both heat and pressure. Some resist corrosive chemicals of all types; others will resist some but not all types of corrosives and high oxygen-bearing solvents. Many of them exceed the resistance to vibration and fatigue failure that conventionally used metals exhibit. Most can have their characteristics tailored to fit many new or unusual applications.

It is not the purpose of this article to discuss, exhaustively, the properties of all plastics, for they are legion. Rather a specific few are discussed together with applications both tried and suggested, as representative of the field. Refiners should consider their use not only because of the wartime shortage of many commonly used materials, but from a selfish standpoint as well; the raw materials of many plastics are either derived from or can be derived from what they have to sell—petroleum and by-products of refining.

Diversified Applications

Many plastics, of one type or another, can be used to replace such strategic materials as copper, brass, iron, nickel, stainless steel and ceramics, for example, in services where with-

standing extremes of temperature or rigidity are not prime requisites. This can mean that plastic tubing may be used to replace copper in control instruments where control is maintained by varying air pressure. Rubber-like plastics can be used in hose for conveying gasoline, such as at filling station and tank-wagon pumps, in automobiles and aircraft—indeed they are so being used. Some also can be used for conveyor belting, or as shock absorbers, and in protective clothing. They are also being used for insulation, both electrical and thermal.

Other types may be used instead of iron, brass, and copper in piping water, such as in the form of conventional plumbing. They may be employed as protective coatings for oil, gas and water pipe in particularly corrosive soil conditions—both above and below ground—and as tubing for piping chemicals. They may be used in conduiting for air-conditioning systems and as protective covering for floors, especially where corrosive chemicals or oils are encountered. Wooden tanks can be used to store acids or gasoline, for example, if the interior is protected by any one of several types of plastics.

One type of plastic coating has been in successful use for more than a year as a lining for steel tanks storing 100-octane gasoline, where, in this particular installation, it is the practice to force the gasoline from the tank by forcing sea water in at the bottom. This same plastic has been approved by the U. S. Navy as a lining for pre-stressed concrete tanks used to store 100-octane aviation gasoline and aromatic-enriched aviation gasoline, as well as in the same type of tanks storing diesel fuel oil.

Thus, containers for various petroleum products could be made out of certain types of plastics, or made of other materials and either lined or impregnated with plastic. In the case of small containers for lubricating oils and greases, for example, entire construction of plastic would free large quantities of scarce metals, and at the same time eliminate some of the drawbacks inherent in other suggested substitute materials, such as glass or paper. Containers could be made returnable, thus reducing costs; or stiff paper could be impregnated with the plastic, a method even less expensive than that of complete fabrication from plastic.

Two General Types of Plastics

Plastics generally may be divided into two types: thermoplastic and thermosetting resins. The former softens upon application of heat and then is ready for molding or extrusion. As soon as it cools below its "softening point", it resumes its former characteristics. The latter, as its name implies, "sets" upon application of heat into its final form, very similar to vulcanization of natural rubber. Addition of "plasticisers" to either type will alter the characteristics.

Tables following give the physical properties and laboratory test data of several representative types of commercially available plastics, as furnished by their manufacturers or sales agents.

American Pipe and Construction Co., Los Angeles, markets a plastic called Amercoat made from a combination of thermoplastic resins, for cold-applied use as a guard against corrosion and contamination. Its base substances are odorless, tasteless and chemically inert synthetic organic resins which possess many of the physical properties of the familiar molded resins of the same type.

It is resistant to cold dilute mineral acids, such as hydrochloric, sulfuric, phosphoric, and nitric; unaffected at normal temperatures by sodium and potassium hydroxide, and caustic cleaning and sterilizing agents such as calcium and sodium hypochlorite; resistant to oils, fats, waxes and aliphatic hydrocarbons such as gasoline—leaded or unleaded and 100-octane regular or aromatic-enriched. It resists the action of many chemicals such as aluminum sulfate, acetate, carbonate, chloride phospate and sulfate of ammonia; copper sulfate; ferrous sulfates; lead acetate; chloride and citrate of magnesium; as well as such oxidizing agents as chlorate, dichromate and permanganate of potassium.

It has a low water absorption and because it contains no paint, oils coming in contact with it will not oxidize, hydrolize or saponify; and in addition it has quite a high dielectric strength and is resistant to electrolysis.

However, it is not resistant to acetic and formic acids in excess of 2%; full strength hydrochloric, nitric and sulfuric acids; aldehydes; benzene; carbon disulfide; chlorinated hydrocarbons, cresols; esters; ethers; phenol; toluene, xylene and ketones.

The manufacturer recommends Amercoat for many corrosion conditions. The following examples of uses in the petroleum industry are given:

It was applied as a protective coating in 100-octane gasoline storage tanks where sea water

General Properties of Plastics†

Properties°	Cellulose Acetate	Cellulose Acetate Butyrate	Ethyl Cellulose	Methyl-Methacrylate	Styrene	Vinylite
Specific Gravity	1.27	1.14—1.22	1.12-1.15	1.2	1.054	1.34—1.36
Strength, Tensile, lbs. per sq. in.	3000-8000	4200-7700	6,000-9,000	5800—8800	5,300-6,800	(8-10) x 10^3
Strength, Compressive lbs. per sq. in.	11,000-27,000	12,600-23,100	10,000-12,000	7% def.-13,000 lbs.	11,500-15,000	
Strength, Flexural, lbs. sq. in.	5,000-16,000	4700-12,500	4,000-12,000	9,000-15,000	8,000-9,500	
Strength, Impact, ft. lbs. per notch in.	.7—4.2	0.9—3.0 IZOD	0.6-6.5	0.4—0.6	.5-.9 molded notch	0.3—0.6 IZOD
Modulus of Elasticity, lbs. sq. inch x 10^5	2—3.5	2.0—3.5	1—5	2.3—3.0	5.6 x 10^5	3.5—4.1
Hardness, Brinell, 10 kg, 2.5 inch ball	3-14	51-95 (Rockwell M)	M25—M55 (Rockwell)	18—25 10 MM BALL 500 Kg Load	M60-M115 (Rockwell)	12-15, 550 lbs.-3 min.
Specific Heat, cal. per °C.	.3-.4	0.3—0.4	0.32—0.46	0.35 (gm.)	.32 gm. cal.	0.244
Thermal Expansion, 10^{-5} per °C	8-16	11—16	10—14	7-9 x 10^{-5}	6-8	7.0
Operating Temperature, °F (continuous)	140°—180°	100°—160°	140°—200°	Approx. 160°	176-185 mx. service temp.	
Softening Point, °F	140°—260°	140°—250°	210°—265°	150°—203°	265°—275°	140°—150°
Distortion under Heat °F	122°—212°	125°—200°	120°—200°	140°—180°	169°—174°	140°—150°
Thermal Conductivity, 10^{-4} cal. sec. cm. °C	4.5-7.8	4.5—7.8	5.6	4.3	1:9	(cal. sec.$^{-1}$ cm^{1} (°c)$^{-1}$) 39 x $10x^{5}$
Cold Flow	Slight	Slight	Slight	Practically nil	Slight	Slight
Volume Resistivity, ohms cm.	(0.7—1.4) x 10^{12}	(0.7-1.4) x 10^{12}	10^{15}	Greater than 10^{15}	10^{17}-10^{19}	
Grams per cu. in.	20.8—22.5	13.7—19.9	18.4—18.8			
Refractive Index, N_d	1.47—1.50	1.47—1.48	1.470	1.49—1.51		1.53
Dielectric Strength, volts per mil	850	250—400	400—600	500	500-700	
Dielectric Constant, 60 cycles	3.5—6.4	3.5—6.4	2.7	3.5—4.0	2.5-2.6	R.F.—4.0
Dielectric Constant, 10^3 cycles	4.5—6.0	3.3—6.3	2.5—3.5	3.0	2.5-2.65	
Dielectric Constant, 10^6 cycles	3.2—6.2	3.2—6.2	2.0—3.0	2.8	2.5-2.6	
Power Factor, 60 cycles	.01—.06	0.01—0.06	0.007	7.0%	.0001-.0003	60-1,000 cycle-% 1.43 (1000) R.F. % 1.75
Power Factor, 10^3 cycles	.01—.06	0.01—0.06	0.005—0.025	7.0%	.0001-.0003	
Power Factor, 10^6 cycles	.01—.06	0.01—0.05	0.007—0.03	1.5%	.0001-.0003	
Water Absorption, % by wght.—24 hrs.	2.4—3.5	1.35—1.75	0.5—1.5	0.3—0.4	.04-.06	25°c—.05—.15%
Elongation, %	15—60	12—48	10—40	3.—6.%	2.5-3.5	
Burning Rate	Slow	Slow	Slow	Slow	.5-.8 in. Min.	Will not support combustion
Effect of Age	Slight	Slight	Slight	Practically nil	None	None
Effect of Sunlight	Slight	Slight	Slight	Practically nil	Yellows slightly	Darkens upon prolonged exposure
Effect of Strong Acids	Decomposes	Decomposes	Decomposes	Affected only by Oxidizing acids	Mostly none	None
Effect of Strong Alkalies	Decomposes	Decomposes	None	Practically nil	Mostly none	None
Machining Qualities	Excellent	Excellent	Good	Good	Poor	Good

†Courtesy R. D. Werner Co., New York City.
°Properties shown are based on one formula out of many for each material.

is used to force out the gasoline—it is impervious to alternate action of salt water and gasoline where steel alone is not.

In another example, a 60-in. concrete waste line in a large refinery was being disintegrated by action of waste liquids varying from salt to fresh, and from acid to alkali, at normal temperatures of from 100° to 130° F. After three years a sizeable test section coated with the plastic was entirely unaffected.

Still other applications are as a mortar in laying up acid-proof brick in waste catch basins; elimination of corrosion in steel tanks used for storage of aluminum sulfate for fire protection; and as corrosion-resistant coating for a storage tank roof exposed to chlorine vapors from a cooling tower.

One large oil company reports that it has had test panels coated with this material exposed to salt water and gasoline in a test box equipped for running corrosion tests, and for simulating conditions in the tank of a gasoline cargo vessel. After 17 months the coating still was giving complete protection. Report went on to state that test panels had also been placed in the tank of a gasoline cargo vessel. After 6 months' exposure they gave no visible evidence of breakdown in the coating. Further tests are under way and appear to be promising.

Koroseal is a comprehensive name used commercially to describe a group of plasticised vinyl resins developed by the B. F. Goodrich Co. It is based on the discovery that polyvinyl chloride resin formed workable rubber-like materials when certain high boiling-point organic liquids (plasticisers) were combined with it.

Process of formation may be divided into three steps: (1) preparation of vinyl chloride from hydrogen chloride and acetylene (produced from petroleum, or from coke and limestone); (2) polymerization of the vinyl chloride into polyvinyl chloride by heat, catalysts and modifying agents; and (3) formation of Koroseal by addition of plasticisers (a group of organic materials which are capable of converting the resin into a workable, thermoplastic mass), stabilizers and pigments.

A wide range of physical properties may be obtained by variation of the polymerizing process as well as proper choice of the plasticisers and stabilizers used. Material may be molded, extruded, milled and calendared like natural and synthetic rubber, and also may be purchased in solution and gel forms.

The manufacturer states that the resistance of this plastic to chemicals and its high dielectric strength, as well as ability to withstand mechanical abuse, make applications very versatile.

"The chemical resistance of Koroseal is of prime importance in its use as an insulator on plating racks. Other chemical applications are many and varied, such as coatings for oil and gas pipe in particularly corrosive soil conditions, tubing for piping chemicals. . . acid resistant fabrics, gas resistant fabrics, gas masks, and all types of weatherproof and protecting coatings, even food packages, oil containers and bottle seals. Electrically, applications have coincided with almost the entire field of rubber insulation and jacketing materials and. . .have superseded old types of construction where a combination of many materials was necessary to obtain a finished product."

Manufacturer also states that it is used as a shock-absorbing sponge, gaskets on mechanical equipment, conveyor belting and all types of molded articles, as well as in other, miscellaneous, forms. This plastic is now among the critical materials, however, and is available only by allocation for a high priority rating.

Resistoflex PVA is a synthetic polyvinyl ace-

Koroseal Physical Constants*

Specific gravity	1.20 to 1.41 (unpigmented)
Specific volume	23.0 to 19.8 cu. in. per lb. (unpigmented)
Specific heat conductivity	K = 39x10^5 to 33x10^5 cal./(sec.)/(sq. cm.)/(°C/cm.) or 1.13 to 0.96 B.t.u./(hr.)/(sq. ft.)/(°F/in.)
Specific heat	0.32 to 0.51
Coefficient of friction	Bone hard / Soft Dry 0.13—0.16 / 0.20—1.80 Lubricated 0.13—0.16 / 0.05—0.10
Tensile strength	2000—3000 lbs./sq. in. (batch stocks)
Hardness (Shore Durometer Type A at 30° C)	60 to 100 (batch stocks)
Elongation	2% to 500%
Compression set	This varies considerably depending upon the exact compound, but is generally somewhat greater than rubber compounds.
Volume compressibility	Practically incompressible.
Tearing strength	Very tear resistant—generally comparable with rubber compounds.
Flexibility	Much better than rubber at normal temperatures in flexing life tests. Certain compounds will flex at temperatures as low as —40° C.
Impact strength	100 inch pounds per sq. in. at room temperature. The softer compounds behave generally like rubber.
Abrasion resistance	Koroseal is better than rubber at normal temperatures but softens and flows at elevated temperatures.

*Courtesy B. F. Goodrich Co., Akron, O. This plastic is now on the list of strategic materials and it cannot be considered a substitute for other materials.

tate resin made by the Resistoflex Corp., and is best described as falling half way between synthetic rubbers and plastics. Chemically it is a solid colloidal solution, its high molecular weight ingredients highly polymerized and of low specific gravity. Its raw materials are petroleum coke, coal or acetylene, air and water.

The various formulae of Resistoflex compounds are prepared from a white to pale amber resin neither thermoplastic nor thermosetting until compounded and partly processed. Extreme care must be exercised in holding close tolerances for solvent loss, temperature and pressure in processing. It does not become a tough, strong, flexible and resilient material until during the extruding or molding process.

This plastic is now supplied in various types of lube and grease hose; hydraulic hose for use with various types of hydraulic brake and shock absorber systems; and as a chemical hose which is completely inert to such chemicals as carbon tetrachloride, trichlorethylene, benzol, ether, etc., but which is not recommended for use with acids or alkalies in any concentration. It is also supplied in hose for paint and solvent sprayers, for handling refrigerants, and as a low-pressure and laboratory hose with internal diameters up to 1 in. Hose may be supplied with standard type fittings for connection to any pipe or S.A.E.-threaded hose connection. Working temperature range recommended is from —40° to 250° F. Work aprons, industrial gloves, molded shapes and sheet stocks are available, and this plastic may be obtained in solution form also for coating or painting.

Saran is a synthetic thermoplastic produced by the Dow Chemical Co., and formed by the co-polymerization of vinylidene and vinyl chlorides. It is tasteless, odorless, non-toxic and non-inflammable in basic form. The group of resins derived from unsymmetrical dichlorethylene and known as vinylidene chloride resins are made from petroleum and brine. Ethylene from petroleum and chlorine from brine can be combined chemically to form monomeric vinylidene chloride, a clear, colorless liquid boiling at 98° F. Polymerization and also co-polymerization with vinyl chlorides may be so varied as to produce resins ranging from flexible, moderately soluble materials having softening points as low as 158° F., to hard, tough thermoplastics having softening points as high as 350° F. or more.

The present standard commercially available material is a thermoplastic having a softening point of approximately 240°-280° F. Toughness and resistance to abrasion are said to be of a high order, as well as the retention of these properties upon aging. It is supplied in tubing and pipe form, as well as sheets of varying thickness. Manufacturer recommends that it be used where chemical resistance, flexibility and fatigue strength are the most important factors to be considered; no attempt to substitute for copper, for example, should be made where resistance to high temperatures or stiffness are prime requisites. There are many applications such as in air-controlled instruments or valves, transfer of air or water and the like.

Conventional type of fittings may be used on Saran plastic in either tubing or pipe form. Flanges and various types of tubing fittings are commercially available which are fabricated from the plastic. It may be flared by standard tools; welded by putting the two ends to be joined on a nickel or chromium plated hot plate heated to about 400° F. for a few seconds, and then pressing them together.

The manufacturer recommends: "In bending Saran tubing at room temperature, the tendency to kink decreases with increasing wall thickness. At a wall thickness equal to 20% or more of the diameter of the tubing, it is extremely difficult to kink or collapse. Even in those cases where actual kinking or total collapse occurs, the bursting pressure is reduced no more than 20%. Fabrication such as bending or forming to permanent desired shapes is easily accomplished. The tubing is formed at room temperature to the required shape, plus allowance for 20%-30% springback. It is then heated to approximately 212° F. for 15 to 30 seconds, and on cooling will be set to shape. . . . Without internal support, this tubing can be permanently bent without kinking to a radius as small as 3 to 6 times the diameter of the tubing. Bends can be made to an inside radius as small as one-half the diameter of the tubing by the use of the same

Physical Properties† of Two Typical Resistoflex PVA Compounds

Property	Extruded	Molded
Tensile strength, lbs. per sq. in.	5236	2121
Elongation, % in 2 in. at break	213	445
Permanent Set,* %	78	80
Cold flow,† %	63.2	63.6
Dielectric strength,‡ volts per mil	6.10	10.70
Electrical conductivity ohm-cm.	3.1×10^{7}	3.8×10^{7}
Thermal conductivity, cal. per sec. per sq. cm./1°C. per cm.	5×10^{-4}	18×10^{-4}

*This is the percentage elongation measured after stretching to three-fourths of ultimate elongation, holding for ten minutes, releasing, and allowing to recover for ten minutes.
†This is the percentage deformation of a 0.5-in. cube subjected to a pressure of 4,000 lbs. per sq. in. at 120°F. for 24 hours and allowed to recover for 24 hours.
‡Test made at 72° F. and 50% relative humidity.

Permeability To Gases† of a Typical Extruded Resistoflex PVA Compound at 77° F.

	Hydrogen	Oxygen	Acetylene	Nitrogen
Pressure, lbs. per sq. in.	26.48	27.25	25.01	29.21
Pressure above atmospheric, lbs. per sq. in.	11.77	12.54	10.3	14.50
Permeability, liters per sq. m. per 24 hours per 0.01-cm. in thickness	1.41	51	2.34	0.114
Specific permeability—c.c. per sq. centimeter per centimeter thickness per minute	$.98\times10^{-6}$	35×10^{-6}	1.63×10^{-6}	$.08\times10^{-6}$
Permeability, liters per sq. m. per 24 hours per 0.01-cm. thickness extrapolated to 1 atmosphere	.78	27	1.38	.06

†Courtesy Resistoflex Corp., Belleville, N. J.

Permeability to Liquids† of a Typical Extruded Resistoflex PVA Compound at 77° F.

	Gasoline	Benzene
Pressure above atmosphere	Nil	Nil
Permeability, liters per sq. m. per 24 hours per 0.01-cm. thickness	.058	.057
Specific permeability, c.c. per sq. centimeter per centimeter thickness per minute	$.04\times10^{-6}$	$.04\times10^{-6}$

Effect of Various Solvents† on the Physical Properties of a Typical Extruded Resistoflex PVA Compound; Samples Immersed in Solvents for 240 Hours at Room Temperature

Test	Specific Gravity at 72° F.	Percentage Shrinkage or Expansion in Six In.	Tensile Strength Lbs./Sq. In.	Percentage Elongation in Two In.	Hardness (Durometer)
Original material before immersion	1.259	——	5,236	213	85
66% gasoline by volume, 24% ethanol, 10% benzene	1.195	—1.0	5,057	180	86
Gasoline (leaded)	1.260	—0.30	5,255	220	85
Kerosene	1.255	+0.30	5,247	220	84
Benzene (benzol)	1.251	+0.30	5,290	225	84
Xylol	1.260	+0.20	5,351	220	84
Acetylene gas	1.256	+0.10	5,340	220	85
Methylene dichloride	1.261	—0.40	5,110	225	84
Trichlorethylene	1.253	+0.10	5,140	225	86
Carbon tetrachloride	1.259	0.00	5,084	145	84
Monochlorbenzol	1.258	+0.10	5,026	190	84
Methanol (anhydrous)	1.203	—6.50	5,980	195	86
Ethanol (anhydrous)	1.181	—4.30	5,779	190	87
Ethylene glycol	1.186	+4.70	4,335	185	77
Acetone	1.246	—1.20	5,203	175	87
Petrohol	1.224	—1.30	5,971	165	89
Furfurol	1.250	—2.00	5,890	175	88
Methyl acetate	1.269	—0.70	5,403	185	85
Ethyl Acetoacetate	1.258	—0.50	5,491	205	85
Diethyl ether	1.260	—0.30	4,980	230	86
Dioxane	1.271	—1.30	5,272	195	85
"Freon" gas	1.270	—0.50	5,636	205	86
Butane gas	1.268	+0.30	5,352	200	86
Propane gas	1.267	+0.20	5,529	200	87
Sulphur dioxide	1.269	+0.50	5,497	215	86
Aniline	1.256	+0.10	4,990	220	86
Formamide	1.201	—4.00	3,845	195	77
Oxygen bomb accelerated aging test 300 lbs. oxygen pressure at 160° F. for 240 hours	1.259	+0.16	4,990	220	86

†Courtesy Resistoflex Corp., Belleview, N. J.

technique, but with the addition of an internal fluid. By this method it is possible to fabricate many complex shapes, such as elbows, traps, nozzles, etc., where a permanent set is necessary."

One large oil company has used this plastic in low temperature, non-hazardous services as a substitute for copper and steel tubing in cooling water lines to pumps, in air lines to control valves and in lubricating oil lines to compressors. The company carries stocks in its warehouse and believes more timely applications will be found. Service characteristics of Saran are compared with those of copper by this oil company as follows:

Service Conditions	Saran	Copper
Vibration fatigue	Excellent	Limited
Clarity	Semi-trans.	Opaque
Flexibility	Flexible	Stiff
Heat conductivity	Slow	Rapid
Max. working temp.	170° F.	High
Ease of damage	Easily cut and crushes under a sharp blow	Flattens under a sharp blow

Chemical resistance of Saran and copper, based on 3 months' test at room temperature, was compared as follows:

	Saran	Copper
Acids	Excellent	Fair
Caustic	Good	Good
Air	Excellent	Excellent
Water	Excellent	Excellent
Lub. Oil	Excellent	Excellent

"Flaring of Saran tubing for making joints can be accomplished at room temperature with compression type flaring tools or by spinning," said the oil company's instructions for handling this plastic. "If the tubing is cold, it is recommended that the end of the tubing and the flaring tool be heated to room temperature before flaring is attempted.

"Fabrication, such as bending or forming to permanent desired shapes, is easily accomplished. The tubing is formed at room temperature to the required shape plus allowance for 20% to 30% spring-back. It is then heated to approximately 212 deg. F. for 15 to 20 seconds and, on cooling, will be set to shape.

"Without internal support, this tubing can be permanently bent without kinking to a radius as small as 3 to 6 times the diameter of the tubing. Bends can be made to an inside radius as small as ½ the diameter of the tubing by the use of the same technique but with the addition of an internal fluid. By this method it is possible to fabricate many complex shapes, such as elbows, traps, nozzles, etc., where a permanent set is necessary."

Properties of Saran Tubing

I. Mechanical Properties

Bursting pressures at 77° F.:

O.D.	Wall	Bursting Pressure	Recommended Working Pressure (Safety Factor = 5)
⅛"	0.031"	1900 p.s.i.	380 p.s.i.
¼"	.031"	1250 p.s.i.	250 p.s.i.
⅜"	.031"	900 p.s.i.	180 p.s.i.
¼"	.045"	1350 p.s.i.	270 p.s.i.
⅜"	.062"	1900 p.s.i.	380 p.s.i.
½"	.031"	700 p.s.i.	120 p.s.i.
½"	.062"	1700 p.s.i.	340 p.s.i.
⅝"	.031"	575 p.s.i.	115 p.s.i.
⅝"	.062"	1250 p.s.i.	250 p.s.i.

Tensile strength, ultimate, 4000-6000 p.s.i.
Ultimate elongation, 15-25%.

II. Thermal Properties

Thermal conductivity	0.00022 cal./sec./cm²/deg.C/cm
Resistance to heat (continuous)	satisfactory up to 170°F.
Heat distortion temperature	150-180°F.
Tendency to cold flow	slight
Coefficient of thermal expansion	15.8 x 10^{-5}/deg. C
Melting point	310-325°F.
Resistance to low temperature	becomes stiff and brittle

III. General Properties

Water absorption	24 hours at 77°F=0.00%
Water absorption	168 hours at 165°F=0.5%
Water permeability	negligible
Machining qualities	good
Burning rate	self-extinguishing
Fatigue resistance	excellent
Effect of sunlight	darkens slightly

IV. Chemical Resistance

Reagent	Stability Rating	Reagent	Stability Rating
98% (conc.) H_2SO_4	Good	10% NaOH	Good
Up to 60% H_2SO_4	Excellent	28% NH_3 (aqueous)	Unsuitable
5% H_2SO_4	"	10% NH_3 (aqueous)	Poor
Up to 35% (conc.) HCl	"	Ethyl Gasoline	"
Up to 65% (conc.) HNO_3	"	Lubricating Oil	Excellent
Glacial Acetic	"	Water	"
10% Acetic	"	Air	"
50% NaOH	Fair		

Acid-Proof Brick Replaces Cast Iron Sewer

Construction of plants to supply new wartime products by new processes sometimes calls for changes in standard installations about a refinery. The photographs show (1) dismantling an old cast iron sewer at a Standard Oil Co. of Indiana refinery; (2) setting the forms, and (3) lining the new sewer with acid-proof brick

Houdry Two-Stage Dehydrogenation Catalytic Process for Manufacture of Butadiene

By C. H. Thayer,* R. C. Lassiat** and E. R. Lederer***

AnAPA ★ WAR REFINING ARTICLE

The economic advantages of the new Houdry two-stage process for the production of butadiene are described in the accompanying article. These include the use of butane as raw material, in place of butylene which is also a raw material needed for 100-octane aviation gasoline production. The available supply of normal butane in the country is estimated at 175,000 b/d, of which 30,000 b/d processed in Houdry plants could yield 660,000 tons of butadiene annually, it is claimed. Other advantages shown are economy of material in plant design, quick construction time and the conversion of such plants, following the war, to produce high octane gasoline and the components of aviation gasoline at reasonable cost.

THE shortage of natural rubber caused by the war led logically to the application of the Houdry process to the production of butadiene. Houdry's research of catalytic processes since 1923 and experience gained in large scale cracking and aviation gasoline plants employing his process are fully utilized in the design of plants for producing butadiene.

This article deals with Houdry's two-stage dehydrogenation process for production of 15,000 tons of butadiene per year in each plant. Such a plant is now being built by Sun Oil Co. for the Defense Plant Corp. to supply butadiene to the Rubber Reserve Corp. This size plant is suited for smaller refineries and for natural gasoline and recycling plants where a sufficient supply of butane is available. It can be also erected in natural gas fields where butane is separated from natural gas, while the balance of the de-butanized gas may be piped away to serve as gas fuel or stored in the ground.

Economy of Material

The design of these small butadiene plants permits the use of 60% to 75% of material either existing at such plants or easily available as second-hand equipment. Sun Oil Co. has found sufficient material for the construction of its plant so that, of the estimated gross expenditure for this project of $3,254,420, the actual value of the material to be used is $1,720,000, and only $313,686, or 18.2%, of this amount is represented by new critical materials requiring priority. The total weight of the material to be used in this project, excluding masonry and lumber, is estimated at 6025 tons, of which 80%, or 4822 tons, consists of existing or second-hand equipment, and only 20% of the weight of the total materials entering into the contemplated construction requires priority.

Another advantage of this process and design is that such a plant can be completed and placed in operation within 6 months after construction has started. After the war these plants may be converted into units for production of high octane gasoline and components of aviation gasoline at reasonable cost.

Butane is used as charging stock, although a mixture of butane-butylene can be used and the first stage of the dehydrogenation process eliminated.

Ample Supply of Feed Stock

Butane, however, is preferred because it is available in large quantities in relatively pure form at refineries, as a by-product of alkylation processes for the manufacture of aviation gasoline, in natural gasoline and recycle plants. Furthermore, the use of butane does not reduce the raw material needed for the 100 octane aviation gasoline program, as would be the case if butylene is used as feed stock for the production of butadiene.

A careful survey of the potential normal butane production at natural gasoline plants and refineries in the U. S., based on actual 1941 production figures published by the U. S. Bureau of Mines and published data for the first 5 months of 1942, permits the following estimate of potential n-butane production for the current and future years up to 1944 inclusive:

	Bbls. Daily
From natural gas at gasoline plants	92,000
From cracking processes at refineries	36,700
Present in crudes run	50,400

Normal butane is, therefore, available to the extent of at least 175,000 bbls. per day.

Due to the high yield of butadiene ob-

TABLE 1

Estimated Cost, Based on All New Material, for a Houdry Combined Two-Stage Dehydrogenation and Single-Stage Purification Plant for Production of 15,000 Tons a Year of Butadiene

I. Process Plants	
a. Dehydrogenation Plant	$1,902,825
b. Purification Unit	955,000
c. Auxiliaries — Services and Utilities	559,100
Total	$3,416,925
II. General Administrative, Purchasing, Engineering & Development Expense	225,000
III. Grand Total	$3,641,925

TABLE 2

Material Requirements for Houdry Combined Two-Step Dehydrogenation and Purification Plant for Production of 15,000 Tons/Year Butadiene

25% has been added to all items for contingency

	Weight—Tons		
	Dehydrogen. & Separation Unit	Purification Unit	Total
1—Carbon Steel Plate	293	250	543
2—Structural Steel	484	143	627
3—Reinforcing Steel	63	19	82
4—Steel Tubular Material	1,015	360	1,375
5—Steel Forgings	68	38	106
6—Forged Steel Valves	3	2	5
7—Cast Steel Valves	234	38	272
8—Cast Steel Castings	109		109
9—Carbon Steel Bolts	10	3	13
TOTAL CARBON STEEL	2,279	853	3,132
10—Cast Iron Castings	42	34	76
11—Cast Iron Castings (Heat resisting)	15		15
12—Cast Iron Valves	25	13	38
TOTAL CAST IRON	82	47	129
13—27% Chrome Steel Plate	30		30
14—Low Alloy Steel Bolts	10	3	13
15—Cast Brass Valves	1	1	2
16—Brass Tubing	19		19
17—Brass and Bronze Plates and Bars	63		63
18—Copper Cable and Bars	16		16
19—Lead Cable Covering	6	2	8
TOTAL NON-FERROUS MATERIALS	105	3	108
20—Machinery	465	60	525
(Compressors, exclusive of refrigeration)	2,450 H.P.	470 H.P.	2,920 H.P.
21—Electric Motors, number	4	5	9
(Exclusive of refrigeration)	295 H.P.	191 H.P.	486 H.P.
22—Transformers	2		2
23—Switch Gear	2		2
24—Instruments and Controls	9	3	12
25—Special Equipment (Cycle Timer, Etc.)	3		3
26—Insulation	375	125	500
27—Welding Rod—Alloy	3		3
28—Welding Rod—Carbon Steel	24	8	32

*Chief Engineer, Sun Oil Co.
**Houdry Process Corp.
***Consulting Engineer, Sun Oil Co.

tained from butane in the Houdry process, 44 plants of this type, charging each 677 bbls. of butane, or a total of about 30,000 b/d, can produce 660,000 tons of butadiene annually, sufficient for the final production of 880,000 tons of rubber, or the entire tonnage proposed at present by the government to be produced from petroleum.

By making fullest possible use of existing equipment, an expenditure for new critical material of less than $40,000,000 would suffice to build these plants. The first 300,000 tons of annual capacity of butadiene could be in operation within 6 to 7 months, and the total required capacity of about 600,000 tons within 9 months after beginning of construction.

Design of Plant

All Houdry plants are designed to operate on very short on-stream periods. Each on-stream period is followed by a regeneration step, whereby carbon deposited on the catalyst is removed and the catalyst maintained in a very active condition. The useful life of the catalyst is expected to be more than 6 months. Due to the relatively pure form of the charging stock the carbon deposit is comparatively small.

High yield obtained in this process reduce the amount of charging stock required and, consequently, also the size of equipment necessary to produce a given amount of butadiene.

Operating temperatures are relatively low so that requirement for materials and expensive alloy steels is kept to a minimum.

Likewise, utilities, such as steam, fuel, power and water required are low and less material is needed for plant and equipment to supply them.

The equipment of the dehydrogenation unit for production of butadiene is similar to that used in the existing Houdry catalytic plants. The reactors, or catalytic vessels, 6 in number, are of simpler design than in cracking plants.

The charging stock, butane, is subjected to dehydrogenating conditions in the reactors in two stages. The first stage yields butane, butylene and lighter gas. The butane and butylene portion is concentrated in a vapor recovery system to produce the charge for the second dehydrogenating stage in which the butadiene production is effected.

The heat required for the chemical change of butane to butylene and from butylene to butadiene is furnished by burning the carbon deposit on the catalyst during the dehydrogenating stages. The regeneration of the catalyst is accomplished by burning the carbon deposit by passing air through the catalyst. The reactors possess sufficient heat storage capacity to eliminate wide temperature fluctuations, and pressure and rate of flow are regulated so as to balance the heat required for the chemical reactions with the heat supplied by the burning of the carbon deposit.

The Houdry process, so far as we know is the only process which developed the technique of utilizing the adiabatic cycle of heat produced during the burning cycle of the carbon as the principal source of heat required for the dehydrogenation cycle.

The separation and purification of butadiene may be effected by one of the available purification processes.

Yield

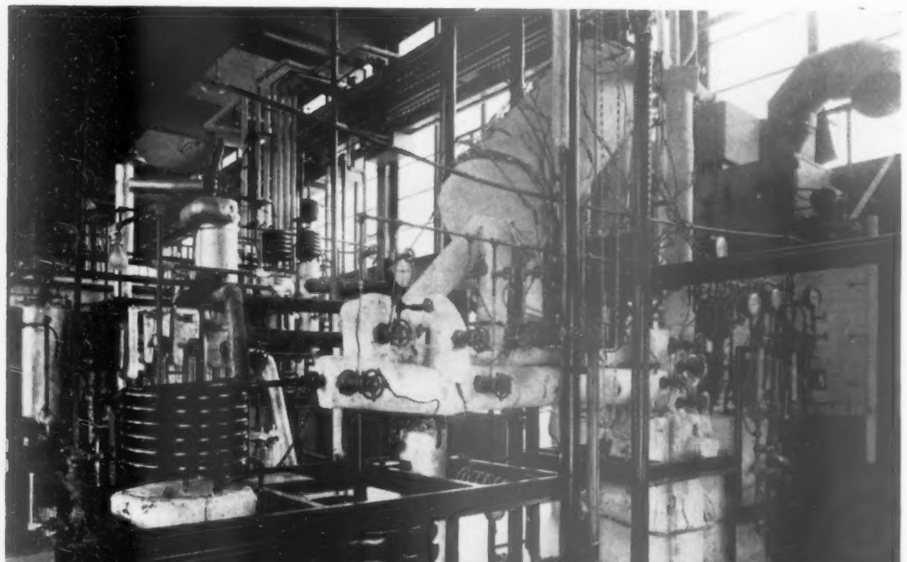
The high yield of butadiene obtained in the Houdry process as shown in the following table is the result of its unique operating cycle.

Overall Material Balance for 15,000 Ton Per Year Houdry Butadiene Plant

Fuel gas	23.6%
Catalyst deposit (burned in the process)	9.5%
Butadiene	66.9%
	100.0%

This material balance allows for losses in butane absorber and is based on 90% recovery of the butadiene in the purification process.

Full details of the process cannot be given since secrecy orders issued by the government preclude their disclosure, except when permits are obtained by persons or companies interested in the erection of plants to utilize the process.



Houdry process butadiene pilot plant

TABLE 3

Utilities Required for a Houdry Combined Two-Stage Butadiene Plant and Purification Plant to Produce 15,000 Tons Per Year

Electric Power	33,600	KWH/day
Fuel Oil or Gas (80,200,000 Btu/hr.)	309	bbls./day
Steam	2,040,000	lbs./day
Cooling Water Circulation	10,000	g.p.m.
Makeup Water for Cooling	300	g.p.m.

If process steam is first expanded through drivers the above electric requirement may be correspondingly reduced.

The above electric power requirement includes refrigeration equipment. If steam or gas driven refrigeration compressors or steam jet refrigeration is used, the power consumption may be reduced by 18,000 KWH per day.

TABLE 4

Estimated Production Cost for a Houdry Combined Two Stage Butadiene Plant to Produce 15,000 Tons Per Year, Including Purification Plant

Estimated Production Cost for a Houdry Combined Two Stage Butadiene Plant to Product 15,000 Tons Per Year, Including Purification Plant	Base Price	Quantity per Day	$ Calendar Day
1—Electric Power	$0.007/KWH	33,600 KWH	$ 235
2—Fuel oil burned (6,000,000 Btu-per bbl.)	1.10 bbl. dld*	309 bbls.	3.40
3—Steam (from fuel or gas)	.33/M lbs.	2,040 M lbs.	673
4—Cooling Water	.008/M gal.	10,000 g.p.m.	115
5—Makeup Water	.15/M gal.	300 g.p.m.	65
6—Operating Labor:			
Process Plant—10 men at $1.20 hr.			288
Laboratory—5 men at $1.20 hr.			144
Undistributed Labor and Supervision			100
7—Catalyst			165
8—Solvent			216
9—Inhibitor			10
10—Maintenance (excl. boilerhouse and water system) 6% of $3,036,420			500
11—Taxes, Insurance—1% of $3,036,420			83
12—Total Operating Cost			$ 2,934
13—Butane Charge	$0.06 gal. 2.52 bbl.	677 bbls.	1,706
14—Fuel Gas Credit	1.10 bbl.	15 bbls.	174 (Cr.)
15—General Administrative Costs $0.075/lb. Butadiene			684
16—Royalty at $0.00125/lb. Butadiene			115
17—Total Cost (excl. amortization)			$ 5,265
18—Cost of butadiene (excl. of amortization) based on 66.9% yield from butane			per. lb. $.06421

*In Tex. or Okla.

Petroleum Pitch is Found Effective In Combating Magnesium Fires

API WAR REFINING ARTICLE

HARD petroleum asphalt of the type produced by numerous refiners can be effectively used for extinguishing magnesium incendiary bomb fires under certain conditions, the U. S. Bureau of Mines reports. Following tests at its Central Experiment Station at Pittsburgh, the bureau states that these pitches, made also from coal tar and water gas tar, can be used to advantage in industrial plants, large office buildings or other structures where trained men can reach the bomb quickly, and where the structure or material on which the bomb comes to rest are somewhat fire resistant.

The use of pitch, with a softening point of 300° F. or above, is also recommended for fires at industrial plants occurring in magnesium shavings, turnings, borings or powder.

Pitch is not suggested for incendiary bomb fires in residences. There it is important to use an extinguishing medium like sand or water, which will prevent the flames from spreading to inflammable surroundings in the home. Pitch is not effective nor is any other material, the bureau reports, for extinguishing the straight thermit bomb, since the thermit reaction supplies its own oxygen.

The effect of the pitch when spread over the magnesium fire is to soften in the heat, flow over the burning mass and cling to it, making a completely airtight cover which stops combustion quickly and permits fairly rapid cooling. If the fire can draw air or moisture from below, a layer of the material must be worked under the fire.

The specifications for hard pitch suitable for extinguishing magnesium fires were described as follows in the Bureau of Mines circular letter, prepared by H. R. Brown, Irving Hartmann and H. P. Greenwald of the staff of the Pittsburgh station:

"To be usable, the pitch must be of the type called 'very hard' and have a softening point of not much less than 300° F. If lump pitch is crushed to the size wanted, not less than 98% of the product should pass a U. S. No. 6 sieve, and 90% or more should be retained on a U. S. No. 40 sieve. Equivalent Tyler scale screens are 6 mesh and 35 mesh.

"Flaked pitch may be used without crushing, provided: (1) few if any flakes have an area greater than 1 sq. in.; (2) the flakes are not thicker than ⅛th in.; and (3) 90% or more of the pitch will be retained by a U. S. No. 40 sieve. These specifications are intended to apply to pitch placed in containers of different sizes at the point of production and to allow for some degradation in size during shipment. Pitch shipped in bulk will degrade too much to be used without screening to remove fines after receipt.

"Large lumps or flakes of pitch leave too much air space and soften too slowly when placed on a fire. The size given above gives a satisfactory seal. Fine pitch carries with it a certain hazard of inflammation or explosion. If a cloud of finely divided pitch is formed in the air in contact with a fire, flame will flash through the cloud and may burn those endeavoring to extinguish the fire. Also, fine pitch tends to heat too rapidly and emit dense smoke. Because of the shape of the individual particles, flaked pitch can be used with a larger maximum size than granulated pitch. It will act a little slower but not enough to be a drawback.

"The high softening point specified permits ready crushing, prevents the pitch from becoming too fluid on the fire, and allows storage of the crushed pitch at summer temperature with little or no tendency for the particles to stick or coalesce into a solid mass."

Certain drawbacks are connected with the handling of hard petroleum asphalt or pitch, it is noted in the report, and it is emphasized that the petroleum asphalt must not be confused with petroleum cokes. The bureau's tests showed that hard petroleum asphalts of the same softening point contain more volatile matter than the corresponding hard pitches derived from coal tar; and that the finer sizes are more inflammable.

At summer temperatures the individual particles of the petroleum pitch tested showed a strong tendency to stick and coalesce after a period of standing, which would tend to render the material useless as a fire extinguishing medium. If hard petroleum asphalt is used, the crushed material should be stored in relatively shallow containers, so that the weight on the bottom particles will be reduced. Between temperatures of 40° and 60° F. the material should be examined weekly to determine whether coalescence has started, it was said. If so, the container should be emptied and the original size consistency restored; otherwise new material should be obtained. Above 60° F. the inspection should take place twice a week.

The method for extinguishing magnesium fires in plants by covering the flames with hard pitch is described as follows in the report:

"To extinguish a magnesium fire on metal or dry concrete surfaces or on dry ground, the procedure is simply to spread (not throw) with a long-handled scoop or shovel a layer of pitch over the burning metal. The pitch softens and seals the fire. If, after the first application, the pitch tends to burn with a short flame; this can be stopped by applying a second thin layer of pitch over the flaming parts. Sometimes smoke will issue from the hot mass for several minutes, but no reignition will result.

"After the fire is extinguished, the mass should be allowed to cool for a reasonable time (5 to 10 minutes is enough for a small fire), after which the pitch covering can be removed from the magnesium. If the fire is discovered early and the pitch is applied properly, most of the magnesium will be recovered before it is consumed. If the pitch is allowed to cool until it is quite hard, it should be chipped off the underlying metal or other surface; on machine bends, bronze or other soft tools should be used for this purpose.

"The procedure to be followed in extinguishing magnesium fires on wood floors (or on wet ground) is as follows: Apply a small quantity of pitch over the fire to reduce the heat and glare. Then spread a layer of pitch approximately one inch thick on the floor alongside the fire and carefully transfer the burning mass onto the pitch layer with a shovel or hoe. Finally, cover the entire surface of the fire with more pitch, and also scrape away any burning particles or embers from the floor at the initial location of the fire.

"If, by the time the fire is discovered, the wood floor is badly scorched or burning, then, after the above steps are taken, apply water to the burning wood to prevent the spread of the wood fire. Insofar as possible, in shops with wood floors where magnesium is being processed or handled, care should be taken that metal pans are kept under machine beds so that accumulations of magnesium chips or powder collect in the pans and not on the floor.

"Approximately 2 to 3 lbs. of pitch is required per lb. of magnesium chips or turnings to extinguish a fire promptly. The pitch can be stored at strategic points in lots of approximately 25 lbs. Twenty-five lbs. can be put in a 5 gal. pail. A long-handled shovel should be kept with each container.

Use of Hard Pitch on Bombs

"For combating magnesium bomb fires, hard pitch can be used to advantage in large buildings (such as plants, office buildings and apartments) where trained firemen or fire watchers can reach the bomb quickly, and the structure or materials on which the bomb comes to rest is somewhat fire resistant.

"When the bomb strikes an object, the thermit contained therein is ignited and burns fiercely with considerable sputtering, for about one minute at approximately 4500° F. The bomb should not be approached, and pitch should not be applied during this time, as the reaction supplies its own oxygen and nothing can be done to stop it. After this initial period, only the magnesium shell is burning with an intense white flame at approximately 3000° F.; its burning can be stopped by the use of pitch as follows:

"To extinguish small magnesium incendiary bombs on dry ground, on concrete or on metal surfaces by the use of hard pitch, spread (do not throw) a layer of pitch over the bomb with a long-handled scoop or shovel. This will quickly seal the bomb and stop its burning. To attack fires started by the bomb, water should be used in the usual manner, but care

(*Continued on page R-328*)

Application of Corrosion Resistant Alloys To Natural Gasoline Plants*

By B. B. Morton **

● The behavior of various materials in withstanding corrosion experienced in natural gasoline plants is outlined without regard to their wartime scarcity or priority standing. It is felt that this background of data will be valuable to the plant operator in his selections from among materials available today.

It is recognized that the corrosion in gasoline plants is largely of the electrolytic type and the theory on this type of corrosion is offered, for its usefulness in the adoption of practical means for combating existing conditions. Experience from petroleum refineries, especially the gasoline recovery units, has been drawn upon.

NATURAL gasoline plants are subject to several types of corrosion as a result of the presence of moisture, sulfur and salts encountered in the materials handled. The industry is very widespread and the corrosion problems, therefore, are varied.

In attempting to outline uses of corrosion resistant alloys for this industry, experience with gasoline recovery units within refineries is drawn upon since it is felt that there is a parallel in operating problems. The corrosion within the refinery units is probably more severe than that encountered in the natural gasoline units, due to the presence of organic acids and sulfur compounds not encountered in the field.

The discussion that follows ignores, in part, the shortage of materials resulting from the war effort. While this shortage cannot be ignored in actual operation, it is felt that for the sake of the record it is well to outline the behavior of materials without regard to their present scarcity or priority standing.

Corrosion—General

The corrosion occurring in a natural gasoline plant can be divided into two categories as:

(1) Corrosion occurring in the presence of liquid water.

(2) Corrosion occurring in the absence of liquid water.

Corrosion occurring in the presence of liquid water is of the electrolytic type and responds to the factors of aeration, temperature and velocity. It is markedly affected by the hydrogen ion (pH) value of the liquid.

Corrosion occurring above the dew point of the water is often of the replacement type in which an oxide, sulfide or other compound of the metal is formed.

Electrolytic Corrosion

Where water, suitably contaminated to be an electrolyte, is in contact with metal, a condition exists conducive to electrolytic corrosion. Due to peculiarities of the metal some regions act as anodes; other regions act as cathodes. As a result, a current flows and metal tends to go into solution at the anode, while plating of a metal or of hydrogen tends to take place at the cathode.

In amplification of the above, a metal tends to go into solution, acquire a charge and become ionized. This reaction is referred to as the anodic reaction. The ions of the solution will give up positive charges to provide for the charge of the new metal. Simultaneously, hydrogen or some relatively more noble metal will be plated out, or discharged at the cathode. This is referred to as the cathodic reaction.

There is a tendency to differentiate between electrolytic corrosion occurring on a piece of metal as the result of difference of potential of local spots and corrosion taking place between two pieces of dissimilar metal electrically connected. The case of the single piece of metal can be thought of as the normal type of corrosion for the sake of distinction, and the case of the two metals can be referred to as galvanic corrosion. These nomenclatures will be adhered to in the subsequent discussion.

Galvanic Corrosion

Galvanic corrosion, defined here as the corrosion taking place as the result of the contact of dissimilar metals in an electrolyte, is marked by the accelerated corrosion of the less noble members, the anode, and the retarded corrosion of the more noble metal. In fact, it may be said that the distinguishing feature of galvanic corrosion lies in the fact that the anode reaction (solution of metal) is concentrated on the less noble metal, while the cathode reaction (plating of hydrogen or a metal) is concentrated on the more noble metal.

Galvanic corrosion is influenced not only by temperature, velocity and aeration, but by other factors peculiar to itself. These may be listed as:

1. The difference in potential between the elements of the couple.
2. The resistance in the circuit.
3. The relative areas of the electrodes.
4. The deposit of insoluble material on the anode or cathode.
5. The polarization characteristics of the metals and the solution under exposure conditions.
6. The overvoltage values for the metal forming the couple.

A number of the factors listed above may be in operation at once, which explains the complications surrounding galvanic corrosion.

In an exceedingly brief manner, some comment will be offered on the factors influencing galvanic corrosion.

Consider the galvanic series listed in Table I. Experience has shown that materials closely grouped, as for instance in the aluminum group, have little effect upon each other, regardless of their relative positions. However, a member of a group, as steel, will be considerably affected by being coupled with a member of the copper-brass group. This demonstrates the effect of the differences in potential.

The matter of resistance, item 2 above, is fairly obvious. It points to widely used methods of combating galvanic corrosion by using insulators as paints and other materials. In this connection it can be profitably pointed out that painting or insulating the *cathode*, i.e., the noble material often offers the greatest benefit. As fairly obvious as this procedure becomes upon some thought, it must be admitted that the general practice is to paint or cover the anode (less noble metal). The reason is that the more noble metal is used to resist some media and it appears illogical to cover it.

The effects of relative areas, item 3, is fairly clear. A steel bolt in a copper sheet exposed to sea water would be rapidly destroyed. However, a copper bolt in a steel sheet in sea water would produce but negligible increase of normal corrosion of the steel.

Insoluble deposits, item 4, on the anode or cathode can block further galvanic corrosion by the reduction of effective area, the increase of circuit resistance, the mechanical resistance to the exchange of ions, or a combination of these means. Lead in sulfuric acid of certain concentrations forms an insoluble sulfate which retards further corrosion and renders lead a useful metal in contact with this acid.

Where plating of hydrogen takes place on the cathode, it can retard the corrosion reaction. This hydrogen must be removed by oxygen or by formation and evolution of molecular hydrogen for the reaction to proceed.

The discharge of hydrogen at the cathode

*Presented before California Natural Gasoline Assn. Aug. 6, 1942, Los Angeles.

**Development and Research Division, International Nickel Co., Inc., New York.

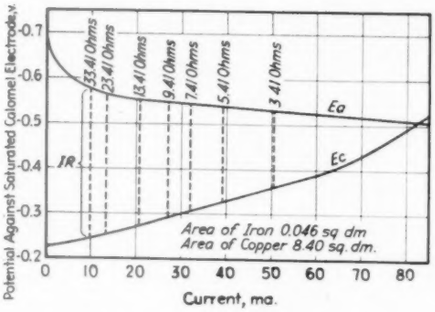


Fig. 1—Graphic determination of the galvanic current at various values of resistance

area may result in the solution at the cathode becoming alkaline due to hydroxyl ions concentrating. In the case of iron, this may result in precipitating insoluble corrosion products.

Polarization, the difference between the potential of an electrode during flow of current and the potential under steady state conditions with no current flowing, is often of controlling importance. When polarization curves are plotted, potential vs. current density for metals under controlled conditions, data are deducible that will permit estimation of corrosion under similar conditions. Fig. 1 is such a graph prepared for iron and copper in a sodium chloride solution. Fig. 2 shows the effect of varying areas.

During corrosion reactions where hydrogen evolution is the principal cathode reaction, the hydrogen overvoltage values of the cathode material may be an important factor. Hydrogen overvoltage may be defined as the additional potential, above the theoretical, required to produce hydrogen evolution at the cathode. The value of the "overvoltage" varies with the material and the condition of the surface. It can be seen that the conditions which favor overvoltage are unfavorable to the corrosion reaction and hence may be viewed as beneficial to the life of the metal.

Normal Corrosion

Normal corrosion, defined here as the electrolytic form acting upon a single composition of metal, is affected largely by the items listed in connection with galvanic corrosion, but it is generally more difficult to distinguish which areas of the surface are acting as anodes and which as cathodes. Attention should be directed to special cases where a metal has a degree of nobility conferred upon it by the presence of a film of oxide or of other material. The high chromium alloys represent a case.

It will be noted, for example in the galvanic series of Table I that types 304 and 316 stainless steel occupy one position when active, i.e., free of oxide film, and a more noble position when passive, i.e., protected by an oxide film. It is evident that a high order of potential would exist at a break in the film that would be unfavorable to the metal. This points to the advantage of using these materials in a media possessing a supply of oxygen or other suitable material to maintain and repair the protective film.

Pitting is a common form of corrosion in the case of materials depending upon a film more noble than the metal itself for protection. In this case the interior of the pit functions as the anode and the filmed surface as the cathode.

Concentration Cells

Concentration cells are an important factor in corrosion, especially in the case of copper and high copper alloys.

Concentration cells are explained on the basis of an attempt to reach an equilibrium of metallic ion in a solution. This type of corrosion occurs when a metal contacts a dense concentration of ions at one point of a solution and also contacts another part of the solution which is lower in ion concentration. Ions tend to leave the metal in the lower concentration region to build up to a uniform concentration.

It is clear that if the concentration is maintained constantly lower as by flowing of the fluid, severe wastage of the metal will occur at the region of lower ion concentration.

Concentration cell corrosion can explain many cases that cannot be accounted for by galvanic or normal corrosion. A semi-stagnant location in a stream is an ideal location for instituting this type of corrosion. The effects will be somewhat removed from the stagnant location.

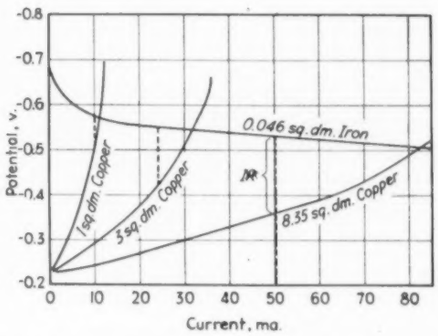


Fig. 2—Graphic determination of galvanic current with different cathode areas

Variations of oxygen content are also credited with establishing "oxygen cell" corrosion. The theory is that the oxygen may be used in reactions with hydrogen at the cathodes; hence the region of high oxygen concentration becomes cathodic to the regions of lower concentrations.

Avoiding Galvanic Corrosion

While galvanic corrosion is a source of intense corrosion of the less noble metal, the principles involved can also be utilized to retard or prevent corrosion of a given part.

The use of galvanized steel is an example of protecting a metal by a less noble protective coating.

Rather obviously, the larger the area of the less noble metal in respect to the nobler metal, the less marked is the effect of the corrosion, provided all of the area is effective to distribute the corrosion. Scrap iron is sometimes used to extend the attacked area or to utilize some of the oxygen.

Zinc is quite often used to protect parts. To make the sacrificial metal most effective, it should possess as large area as conditions permit. It should be well connected to the part to be protected and as close as permissible to the part. The surface of the zinc should be kept free of coatings or incrustations. In general:—Form as efficient battery as possible and recall that the protection of the valued part can only be accomplished by the destruction of the less noble material.

Paints are widely used to protect parts. The use requires some thought if real good is to be accomplished. As has been previously mentioned, painting of an active cathode often is more logical than painting the less noble anode. Imperfections in the paint job will be less injurious. Mr. LaQue, of the International Nickel Co., has outlined some views on the use of paint that follow:

1st Choice: Paint both the materials of the galvanic couple.

2nd Choice: If it should not be practical to paint both metals, paint the more noble one in preference to the less noble one.

3rd Choice: Don't paint at all unless it has

TABLE I—Galvanic Series for Sea Water

Magnesium
Magnesium Alloys

Zinc
Galvanized Steel or Galvanized Wrought Iron

Aluminum 52SH
Aluminum 4S
Aluminum 3S
Aluminum 2S
Aluminum 53ST
Alclad

Cadmium

Aluminum A17ST
Aluminum 17ST
Aluminum 24ST

Mild Steel
Wrought Iron
Cast Iron

Ni-Resist

13% Chromium Stainless Steel, Type 410 (Active)

50-50 Lead Tin Solder

18-8 Stainless Steel, Type 304 (Active)
18-8-3 Stainless Steel, Type 316 (Active)

Lead
Tin

Muntz Metal
Manganese Bronze
Naval Brass

Nickel (Active)
Inconel (Active)

Yellow Brass
Admiralty Brass
Aluminum Bronze
Red Brass
Copper
Silicon Bronze
Ambrac
70:30 Copper Nickel
Comp. G Bronze
Comp. M Bronze

Nickel (Passive)
Inconel (Passive)

Monel

18-8 Stainless Steel, Type 304 (Passive)
18-8-3 Stainless Steel, Type 316 (Passive)

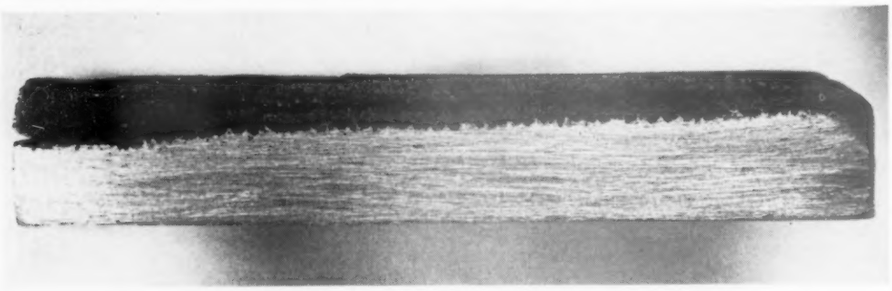


Fig. 3—Cast iron with layer of graphite present after corrosion

TABLE II—Results of Tests of the Effects of a Graphitic Layer upon the Corrosion Rate of Cast Iron

	Milligrams Per Square Decimeter Per Day
1. Normal corrosion rate of graphite-coated cast iron	74
2. Normal corrosion rate of freshly machined cast iron	167
3. Corrosion rate of freshly machined cast iron in contact with equal area of graphite-coated cast iron (average over 9-day tests)	535
4. Initial galvanic corrosion rate	6,900
5. Final galvanic corrosion rate	372

Fig. 4—Monel bolts exposed 22 years in a condenser box to contaminated salt water of Kill van Kull. Bolt on left has been cleaned

been established beforehand that the coating applied to the less noble metal will provide perfect and complete protection for the required length of time.

Replacement Corrosion

Metals operating at elevated temperatures in the absence of liquid water are often attacked by sulfur compounds or by oxygen. Additions of chromium to the analysis are generally made to combat these conditions. The resistance of the metal increases with increasing chromium contents. The first 2% additions often give the most marked improvement. Following additions give increased resistance but at a decreased rate.

Molybdenum is often added to the chromium containing steels to reduce "temper brittleness" and, where needed, to enhance the "creep" strength.

The 18% chromium-8% nickel alloys are most resistant to sulfur. Where organic acids are also present at elevated temperatures (above, say, 500° F.), additions of 2-3% of molybdenum make for improved performance.

Parts of compressors represent locations in natural gasoline plants where corrosion, at elevated temperature in the absence of liquid water, takes place.

Ni-Resist cast iron is a favorite material for liners of compressors handling sour gases. Where "dry back" liners, i.e., liners not exposed to cooling water, are used, the coefficient of thermal expansion of this austenitic cast iron must be considered. The coefficient is approximately 50% greater than for gray cast iron. The coefficient can be changed by varying the composition.

Compressors using Ni-Resist liners, piston and rings have given very favorable service under intensely corrosive conditions.

Valves of 80% nickel-20% chromium, or a modification of this composition, of Inconel (80% nickel-13% chromium), and of Monel are widely used, especially in refinery services.

Alloyed cast irons containing, for example, 1.50% nickel, 0.60% chromium, enter into highly stressed parts of compressors.

Materials of Construction

Cast Iron

Cast iron is widely used in all manner of construction. Its use is justified by its economic position, its good resistance to many varieties of corrosion and its availability.

From a mechanical standpoint, cast irons, properly made and suitably alloyed, have good tensile strength, excellent compressive strength and other desirable properties. Lack of ductility limits the usefulness of this metal.

The graphitic form taken by the corrosive products of cast iron renders it a most useful material for many applications. During corrosion there is often a replacement of oxide or other material for the iron removed. The graphite of the iron is left in place. The result is a porous structure often having the shape of the original piece but lacking any particular strength (Fig. 3).

The graphitized material may decrease or prevent further corrosion of the cast iron. This occurs when the graphitic coating reaches some depth and can be accounted for by the fact that the transfer of attacking reagent through the porous coating is of necessity slowed down. When the pores are very small or are plugged in whole or part, the cast iron parts may greatly outlive steel parts in a given location.

A study of Table II will indicate that while the graphitic coating often acts as a deterrent to corrosion, this layer is quite noble compared with metallic cast iron. From Table II it will be noted from item (1) that the corrosion rate of iron with a graphitic coating is less than (2), an iron freshly machined. Items (3), (4) and (5) indicate the accelerating effect of coupling cast iron free from a graphitic layer with iron containing such a layer. Subsequent to (5) it may be assumed a rate similar to (1) will be obtained due to building up a layer.

Fig. 4 shows some Monel° (69% nickel-29%

°Registered Trade Mark.

Fig. 5—Admiralty metal condenser tubes showing plug-type dezincification (magnification 3x)

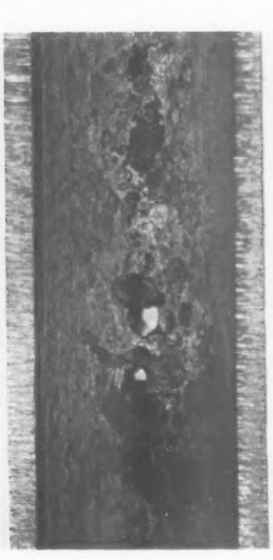


Fig. 6—Admiralty metal condenser tubes showing pitting as a result of deposit attack (magnification 3x)

Fig. 7—Admiralty metal condenser tube showing impingement attack at entrance of tube (magnification 3x)

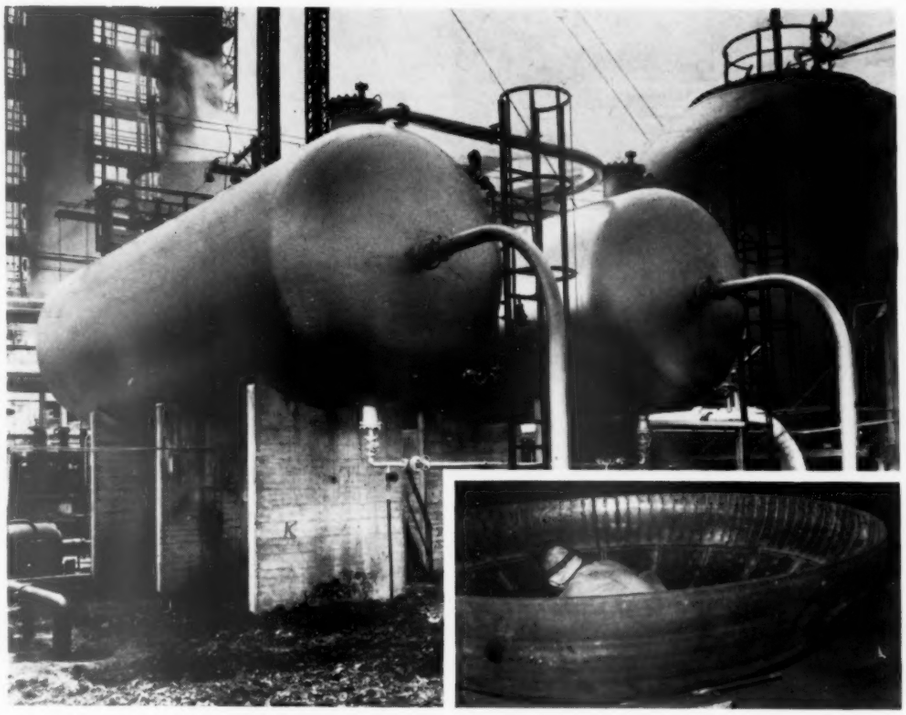


Fig. 8—Monel-lined accumulators. Insert shows method of lining heads. (Wyatt Metal & Boiler Works)

copper alloy) bolts after 22 years of service in the contaminated salt water of Kill Van Kull. The service of these bolts indicates a use for galvanic differences. The bolts are noble to cast iron; hence they are galvanically protected when installed with cast iron flanges. The accelerated corrosion of the cast iron is of little importance due to the vaster area of the iron and also to graphitic products of the corrosion.

Highly alloyed cast iron, such as the austenitic, nonmagnetic form, Ni-Resist (15% nickel-6% copper-2% chromium), is widely used in connection with corrosive sea water. This iron possesses a high degree of corrosion resistance per se, and in addition has less potential difference between the iron and the graphitic corrosion product than exists in the case of gray cast iron. The lower potential is favorable to reduced corrosion rates and is considered an important factor when conditions of the larger are such as to enhance the corrosion rate by autogenous galvanic means.

Ni-Resist finds wide application as pump and compressor parts. It is particularly useful as a valve material to handle sulfuric, caustic and corrosive distillates.

High Copper Alloys

Most processes dealing with petroleum and its products involve additions of heat and extraction of heat. The addition and subtraction of heat both present problems in metallurgy. Probably the extraction presents more numerous and complicated problems, since electrolytic corrosion occurs in many condensers and coolers when water is the coolerant.

Admiralty metal (70% copper-29% zinc-1% tin) is largely used as the material for condenser tubes. This alloy suffers three distinct types of corrosion under appropriate conditions. These three types are dezincification (general and plug type), pitting (frequently at breaks in deposit), and impingement attack (at inlet and when high inlet velocity of water exists). In the absence of these forms of attack, general thinning occurs over a period of time. Figs. 5, 6 and 7 illustrate the three types of failure mentioned above.

Fig. 9—Steel Y reducers, 20 ins. O.D. x 16 in. O.D. x 5-16 in. wall, lined with 16 ga. Monel. Used in connection with fractionating tower. (Robinson Engineering Co.)

Admiralty tubes, while possessing good resistance to many petroleum products, are subject to dezincification in the presence of condensed water from the petroleum fraction or by the cooling waters.

Dezincification apparently occurs by a copper-zinc alloy corroding as a unit, following which copper is selectively deposited on the alloy to form a spongy mass. A somewhat similar reaction has been noted in the case of 70/30 copper-nickel tubes and has been referred to as denickelization. The removal of nickel with the deposition of copper apparently requires special and suitable conditions due to the potential relationship of the 70/30 alloy and copper.

The use of "red brass" is a logical step that has been taken to combat dezincification. Unfortunately sulfur compounds in petroleum fractions apparently attack the red brass with such vigor as to render the expedient useless in many cases. In some places, where condensation of water from the petroleum vapor is not important, duplex tubes of varying compositions for the members of the tube can be used with profit.

Where alkalis as caustic ammonia and others are introduced with the petroleum fractions, duplex tubes with steel on the petroleum side and a high copper alloy on the water side are indicated. Considerable interest centered on duplex tubes and many manufacturers were giving the matter considerable attention prior to the war.

Tests indicate that general dezincification can be suppressed by additions of elements as arsenic, antimony, or phosphorus. Tin is also considered to possess some merit in this connection.

Dezincification can be general or local. If local, "plug" type of pitting results and is quite destructive. Plug type pitting results from local conditions of the metal as non-uniform oxygen distribution.

Foreign matter lodged in a condenser tube is a serious matter. Destruction can take place in the vicinity of the material by cavitation if rapid flow is taking place. Cell effects, either ion cells or oxygen cells, are favored by foreign matter or uneven spots due to scale or mechanical abuse on the water side.

Entrained air or gases contribute greatly to

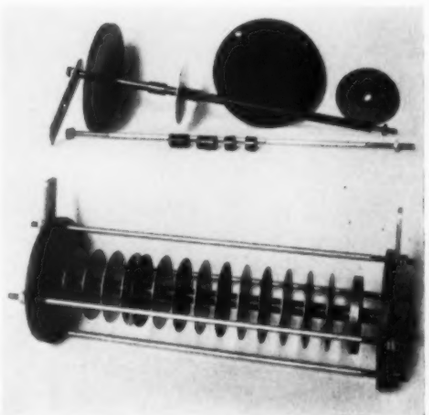


Fig. 10—Test spool used to secure data on type of corrosion resisting material to be used

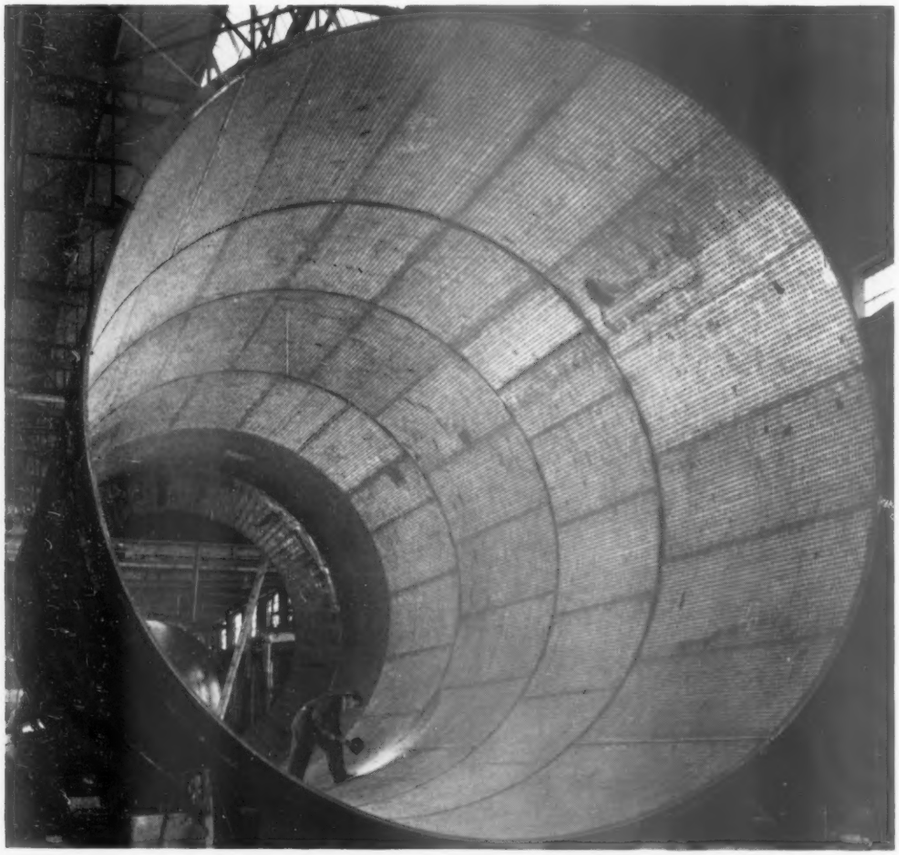


Fig. 11—Section of a large fractionating tower, the top part of which is lined with Monel sheet to withstand corrosion by dilute HCL. Monel tower linings are confined to top sections where temperatures do not exceed 500 deg. F. (A. O. Smith Corp.)

impingement attack. It is especially advisable to remove gases by traps or other devices when the cooling water is to be raised to fairly high temperatures.

Tubes of 70% copper-30% nickel, while exhibiting on the whole an erratic behavior, are gaining in use where a single metal tube is desired. These tubes resist caustic well, are not subject to dezincification and seldom to denickelization, are very resistant to impingement and behave well in the presence of brackish and other salt waters. The history to date indicates 70/30 copper-nickel tubes are quite superior to 80/20 copper-nickel ones in petroleum service.

The 70/30 copper-nickel tubes, in general, can be expected to give a life of 2.5-6 times that obtained from admiralty service in many petroleum applications.

Some factors that contribute to shorten the life of copper alloy tubes are:

1. High water temperatures 160-180° F.

2. High velocity of water.

3. Large volumes of entrained air (Air and gases are released as the temperature of the water rises and should be vented.)

4. Foreign material, scale patches and rough places in tubes. (Both impingement and ceil corrosion can result.)

5. Certain bases can destroy copper-zinc alloys.

6. Locked up drawing stresses can result in corrosion cracking of nearly all non-ferrous alloys.

Condensers

Often condensers have cast iron shells and admiralty or other copper alloy tube bundles. To protect the shell, a base is sometimes introduced. This is a dangerous procedure as the tubes may suffer. A safer practice appears to be to line the shell with Monel and to introduce the base at the discharge. The linings

TABLE III

Product—Straight Run, 63° A.P.I. Gasoline
Temperature—375° F.
Location of Spool—Lower Section of Tower
Time—318 days
Agitation—Common to space between trays

Metal	Pent. Ins. per year
Mild Steel	0.021
Monel (69% Ni-29% Cu)	0.004
Nickel	0.004
Inconel (79% Ni-13% Cr)	0.005
Admiralty Metal	0.008
Cast Iron	0.006
Ni-Resist Cast Iron (15% Ni-6% Cu-2% Cr)	0.002

TABLE IV

Product—Straight Run Gasoline Plus H₂S
Temperature—125° F. (avg.)
Location of Spool—Lower Section of Condenser
Time—253 days
Agitation—Due to flow through condenser

Metal	Pent. Ins. per year
Mild Steel	0.0115
Monel	0.0015
Nickel	0.0018 pitted
70/30 Cu-Ni	0.0031
Admiralty	0.0029
18-8 Stainless	Deeply pitted
Cast Iron	0.0096
Ni-Resist Cast Iron	0.0025

Note: Monel linings in lower parts of condensers have given good service. Steel and 18-8 destroyed in the same locations.

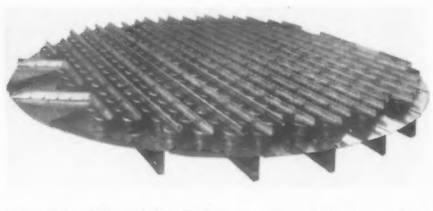


Fig. 12—Monel bubble cap and tray setup. Caps are 1-16" sheet; tray 1-8"; supporting girders under tray 3-16" sheet. Overall diameter 13'. Used in an eastern refinery in the top of towers to resist the corrosives carried back by the reflux

Fig. 13—Inconel heat exchanger bundles. (Foster-Wheeler Corp.)

are installed in many cases by plug welding locally. Use of Monel clad steel results in a neater job. Monel plate welded is used where thin walls are desired, thus making use of the high strength (70-75,000 p.s.i. ultimate strength) of the alloy. Fig. 8 shows a Monel-lined shell.

Piping and fitting of Monel are utilized to handle corrosive products in refineries. (Fig. 9).

Test Results

Due to the complex nature of petroleum, its products and the corrosive agents occurring in connection with them, it is most difficult to predict accurately the type of corrosion resisting material to be used.

The test spool shown in Fig. 10 has been widely employed in the petroleum industry and many data have been accumulated. Some results are reported in Tables III, IV, V, VI and VII.

As the result of tests similar to the ones reported in the tables, a widespread and judicious use of alloys has been made. Fig. 11 shows a large tower lined with Monel at the top and stainless steel at the bottom. Fig. 12 shows some trays and caps of Monel. These are used in the top of towers to resist the corrosives carried back by the reflux.

The general experience has been that Monel is useful below a temperature of 500° F. Above this temperature sulfur attack becomes a factor and chromium containing alloys are indicated.

Some application of Monel within its prescribed temperature limit are: liners for tops of towers and as caps and trays in the top section; liners for "down comer" lines and shells of condensers; liners for circulators and water separators; cables and floats in storage tanks, orifices of meters and many other uses including nails of the "anchor fast" type used to construct boats and similar equipment exposed to salt water. Cooling towers offer a logical application for these nails.

Conclusions

In this paper it is recognized that corrosion occurring in a natural gasoline plant is largely of the electrolytic type. A background of the theory bearing on this type of corrosion is offered with the thought that it might be useful in combating the attack. Certain locations exist where liquid water is absent and in these locations special alloys find application. Experience from petroleum refineries, especially from the gasoline recovery units, has been drawn upon in preparation of the paper.

TABLE V

Product—Caustic (from Mercaptan removal unit. Sodium sulfide, phenolates and Mercaptans.)
Temperature—225° F.
Location of Spool—Top of Reboiler.
Time—131 days
Agitation—Due to flow in column

Metal	Pent. Ins. per year
Mild Steel	0.020 pitted 0.012" max.
Monel	0.0014 uniform
Nickel	0.0240
Inconel	less than 0.0001 uniform
70/30 Cu-Ni	0.0250 pitted 0.003" max.
5% Ni Steel	0.0038 " 0.002" "
3% Ni Steel	0.0026 " 0.002" "

Note: Monel tubes widely used in reboiler heater.

TABLE VI

Product—Straight Run Gasoline—Michigan crude (HCl present)
Temperature—200° F. (approximate)
Location of Spool—Top Tray in Reflux
Time—60 days—unless otherwise noted
Agitation—Common to space between trays

Metal	Pent. Ins. per year
Mild Steel	0.0500
Monel	0.0075
Nickel	0.0069
Yellow Brass	0.0240
18-8 Stainless	0.0254
Gray Cast Iron	0.0430 (90 days)
Ni-resist Cast Iron	0.0131 " "

Note: Corrosive considered to be hydrochloric acid generated from salts.

TABLE VII

Product—Naphthenic Acids in Distillate
Temperature—554° F.
Location of Spool—Between trays in column
Time—60 days
Agitation—Common to space between trays

Metal	Pent. Ins. per year
Mild Steel	0.0163
Monel	0.0012
Nickel	0.0006
Inconel	0.0007
18-8 Stainless	0.0236
18-8-3 Mo. Stainless	0.0020
16-13-3 Mo. Stainless	0.0009
Cast Iron	0.0082
Ni-Resist	0.0109

Inconel (80% Ni-13% Cr) and the molybdenum containing stainless steels are indicated for use. The temperature exceeds the 500° F. limit usually set for Monel and nickel to prevent sulfur attack.

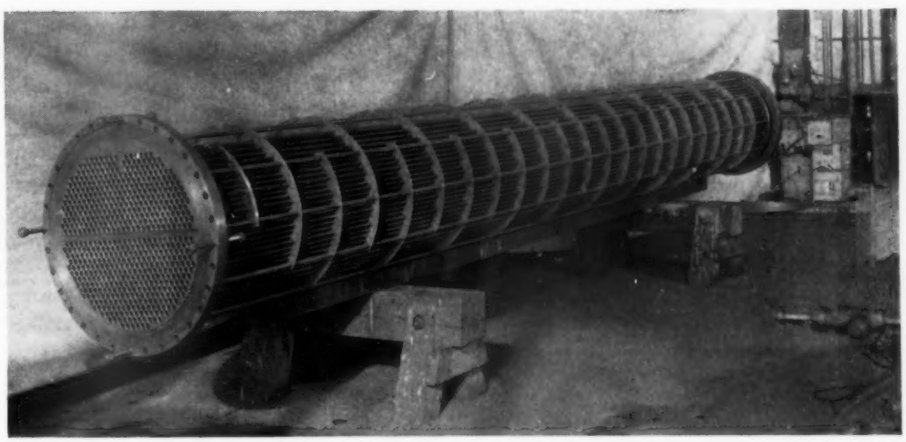


Fig. 14—Monel tube bundle. (Griscom-Russell Co.)

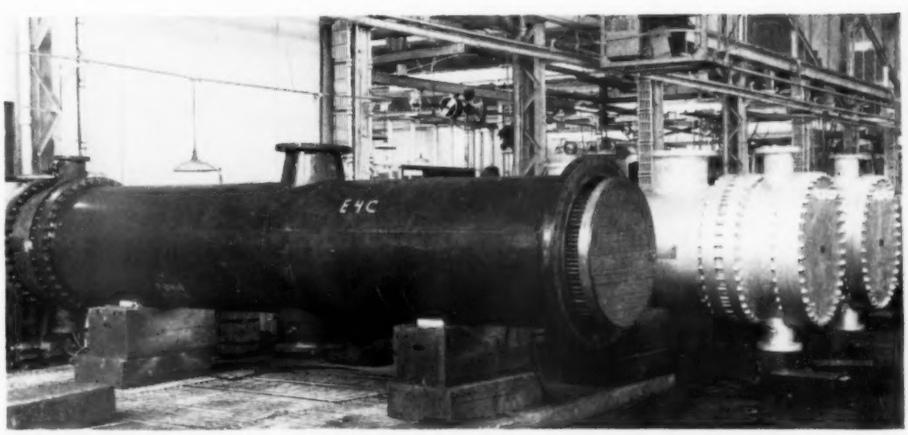


Fig. 15—Monel lined heat exchanger. (Lummus Co.)

Fig. 16—Refinery condensers with money shells and admiralty metal tubes. (Henry Vogt Machine Co.)

How Germans Blackout Refineries Is Told WPRA Technical Group

Operating problems that beset refiners in wartime, such as how to decrease yields of gasoline from crude run to stills, and how to blackout a plant effectively from a bombing attack, were discussed at the round-table of the technical group of the Western Petroleum Refiners Assn. in Shreveport, La., Sept. 11.

At these meetings the refinery chemists and engineers answer and debate questions which have previously been submitted to W.P.R.A. headquarters. This time the questions concerned refiners in Arkansas, Louisiana and Texas particularly. A. W. Trusty, Shreveport, chief chemist, Arkansas Fuel Oil Co., presided at this meeting. Following is a review, by an NPN staff writer, of the comment on some questions.

Has anyone attempted to blackout his plant in cooperation with the OCD? If so, what blackout provisions were made for furnaces and boilers? Lights over gauge glasses on towers? Lights on instruments in control rooms? Light from burning waste gas flare?

Considerable discussion was given to blacking out plants during possible air raids. The conclusion of the discussion appeared to be that while much could be done to avoid damage from flying particles and other damage from indirect hits, it would be very difficult to camouflage a plant entirely or to prevent damage from direct hits. No final conclusions were said to have been reached on complete blackout procedure by the Office of Civilian Defense.

One of the group stated he had been informed that when the Nazis took over oil properties in Roumania, blackouts were attained by means of hoods over furnace openings, use of varicolored bulbs in control rooms, and hoods or other types of light locks at receiver houses. At one plant, flare gases were generally turned into low-pressure gas lines during blackouts; at others flare gases were piped some distance away from the plant (or wells) and permitted to burn there—numerous direct hits were reported in the flare-area.

The Germans organized procedure along the line that refinery personnel should take no part in fire fighting; this was all done by special fire fighting brigades while refinery personnel continued to keep the plant operating. Retaining walls were built up around tanks; not for protection against direct hits, but to stop flying debris from indirect hits and to confine tank contents in case of leakage or damage from direct hits.

During the discussion of this question, the point was brought out that in this country observations during practice blackouts indicated that stacks and towers could be seen from low altitudes despite camouflage attempts, and that mist from cooling towers was observable up to 30,000 ft. altitudes. It was the general opinion that little could be done for protection from direct hits, in light of present information; and that since camouflage painting of tanks and other installations would have to be changed with the seasons, practical considerations at present preclude much being done, except to avoid using white or aluminum paints.

Is it feasible to meet decreased gasoline yields outlined by government by merely lowering the cracking temperature?

The group considered that one feasible way of meeting the government request for decreased yields of gasoline is by lowering cracking temperature. Several present stated they had achieved desired results by lowering cracking temperatures as much as 40°-50° F. Others met the requirement by lowering the time of cracking, either by increased velocity of flow or through by-passing soaking drums. Still others reduced both temperature and pressure; although the former was said to be the controlling factor in decreased yield, while lowering the pressure had the additional effect of reducing pumping costs.

What grade of aviation gasoline can be manufactured from East Texas crude?

The opinion of those present was that an 87-octane aviation gasoline could be made from East Texas crude by use of up to 4 c.c. of tetraethyl lead. This product has been made on an experimental basis to determine commercial feasibility, several technologist's reported. One such product meeting aviation specifications gave "barely 87-octane when leaded", one said, the straight-run material having an unleaded octane rating of 68 with 325° F. end point; another, made from Cotton Valley crude, had a 320° F. end point.

Has the Research octane number been dropped from specifications?

The group's experience is that most buyers have dropped Research octane number from their specifications, although "a few" still insist, some said.

What effect will a sour but caustic washed gasoline have on lines and carburetor parts?

A sour but caustic washed gasoline, it was the opinion of this group of technologists, would do no damage to the motor. One said it was easier to get corrosion from a doctor sweetened gasoline than a sour gasoline, because of the possibility of excess sulfur from improper sweetening. Another said that if gasoline passed the standard corrosion tests, its sweetness or sourness was only a secondary consideration. The whole problem is selling both the public and the companies' sales departments, according to this technologist, who expects that with nationwide gasoline rationing imminent "the public will be glad to take what it can get within a few months".

What do members of this group think about a program to educate the public regarding care of motors for cold weather operation during the war emergency? Most motor operations will be intermittent and at slow speeds. A cold motor causes excessive water condensation in the crank case. Dilution of the oil with fuel will also result because of more frequent choking.

The technologists in the group were of the opinion that industry should educate the public to the new problem in proper lubrication arising from the imminence of nationwide gasoline rationing. With less long distance and high speed operation possible under gasoline rationing, they explained, opportunities for sludge formation, water condensation and lubricant dilution are much enhanced. Lubricant change should occur every 1000 miles—even every 500 miles—or once a month, whichever comes first, it was said. Most members of the group were of the opinion that war industry probably will continue to "take up the slack" in lubricant sales caused by curtailed civilian driving

What modern improvements are there in use of fuel oil in furnaces? This is important since refineries will soon have gas taken away from use under boilers, etc. Improvements in atomization and air mixture are particularly important.

Some refiners have been informed by utilities serving them that at least at certain times they will not be able to supply their requirements of gas for firing boilers and for other uses because of peak load requirements of domestic consumers and essential industries. Question was asked about the improvements in modern fuel oil usage in furnaces, as well as availability of such burners for the indicated conversion or for standby use. Discussion developed that the highest theoretical efficiency of an oil burner was not so important as the control of excess air—refiners could build a burner out of scrap pipe, if necessary, that would do the work, it was said. If sufficient fuel oil is not available, gasoline might be used in its stead, it was suggested.

What, if anything, is being done to promote aircraft use of Mid-Continent oils?

Interest was shown by several in the development of aircraft lubricants from Mid-Continent oils. The main problem, according to one technologist, is to produce an oil that will inhibit scuffing of liners, piston skirts, rings and ring lands. While viscosity index requirements, as well as the scuffing problem, make a Pennsylvania grade lubricant apparently the best at present, it was felt the "VI" specification would not stand in the way if the scuffing problem could be conquered. It was suggested that refiners "show the government what you have to offer", because doubt was expressed that there will be sufficient Pennsylvania grade lubricants to supply the demand developing from expansion of the Allied Nations' air arm.

Cycle Timers on Houdry Unit Control Board Show How Catalyst Cases Are Functioning

In the foreground are the special regulating instruments included in the control board in Houdry process plants

THE Houdry unit control board is more complex than control panels in use on thermal cracking and other refinery units. In addition to the standard recording instruments for measuring temperature, pressure and rates of flow, the Houdry control board contains several special regulating devices peculiar to the Houdry cyclic type operation; namely, the cycle timer, the light flasher system, and the CO_2 recorder.

The heart of the entire Houdry operation is based on the cycle timer functioning properly. The timer is run by a synchronous motor, which has contacts for 900 impulses in one complete revolution which corresponds to one complete case cycle. The timer contact mechanism consists of two vertical panels of 180 segments each. These segments are contacted by a traveling set of contact points which contact on one side going up and the other side going down. A slow rotating screw raises and lowers the contact points. A spare contact panel is provided in case of failure, and alongside of the panel are knobs for manual control.

The impulses, transmitted by the timer, activate electric motors, which open and close the case valves at the proper intervals. These openings and closings are reported back to the control room by red and green lights on the light flasher system located above the cycle timer. This system indicates what is taking place in each of the catalyst cases at all times, and immediately discloses any improper functioning of the case system. If a valve fails to open at the desired time a warning bell is sounded, and the tardy valve can be operated by pushing a button which sets in motion a secondary system of control.

The CO_2 recorder measures the carbon dioxide content of the regenerating fumes during the period when the catalyst carbon deposit is burned. The recordings give a measure of the quantity of combustible materials deposited on the catalyst during the cracking part of the cycle.

Oil's New Double-rel
Produce Both Aviation 'Gal Ru

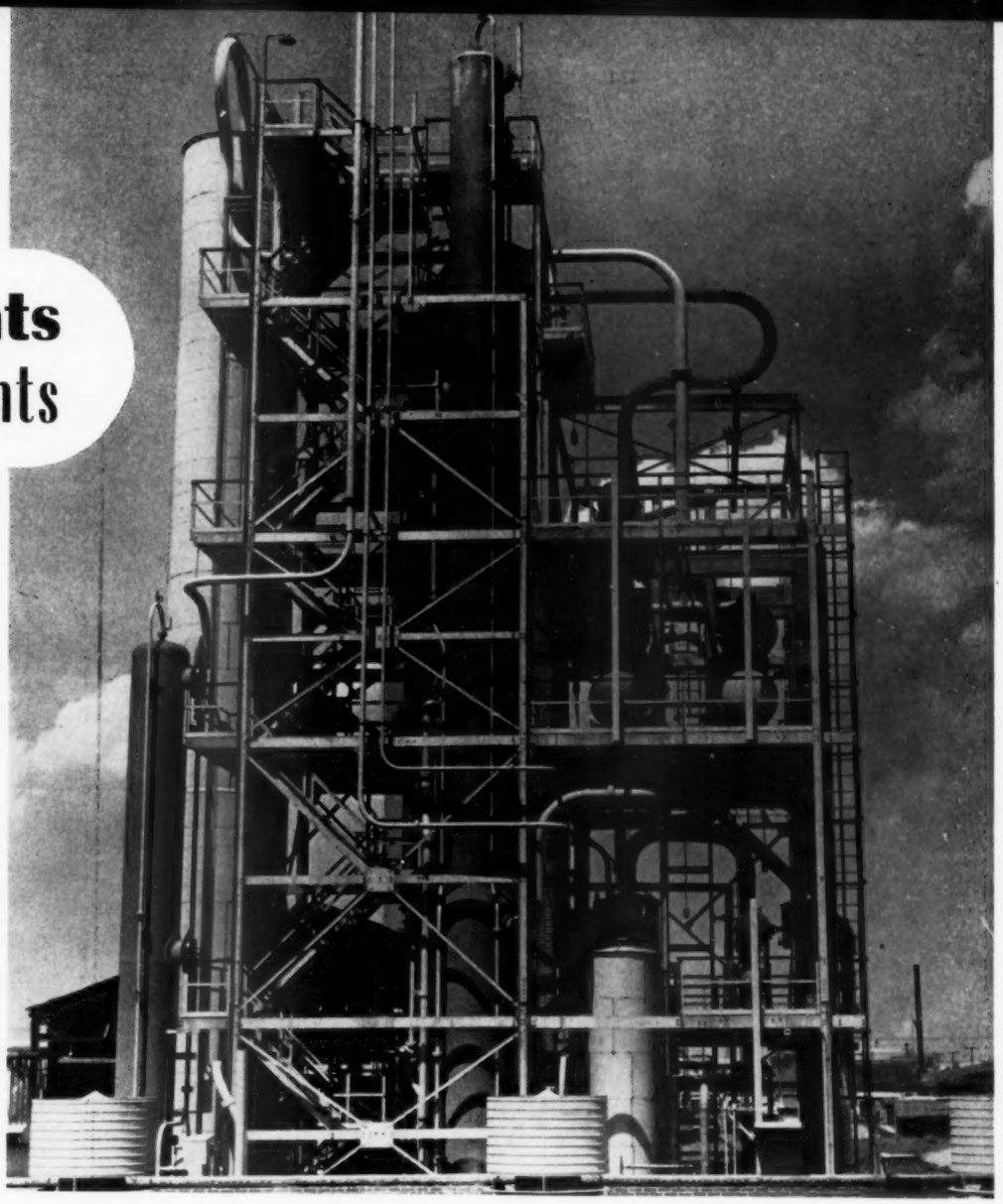
THE new naphtha polyform unit of Socony-Vacuum Oil Co. shown above was completed in 10 months and is part of this company's wartime building program. It is capable of producing 4000 b/d of high octane gasoline and a butane-butylene cut for use in alkylate for aviation gasoline and in the production of butadiene for synthetic rubber.

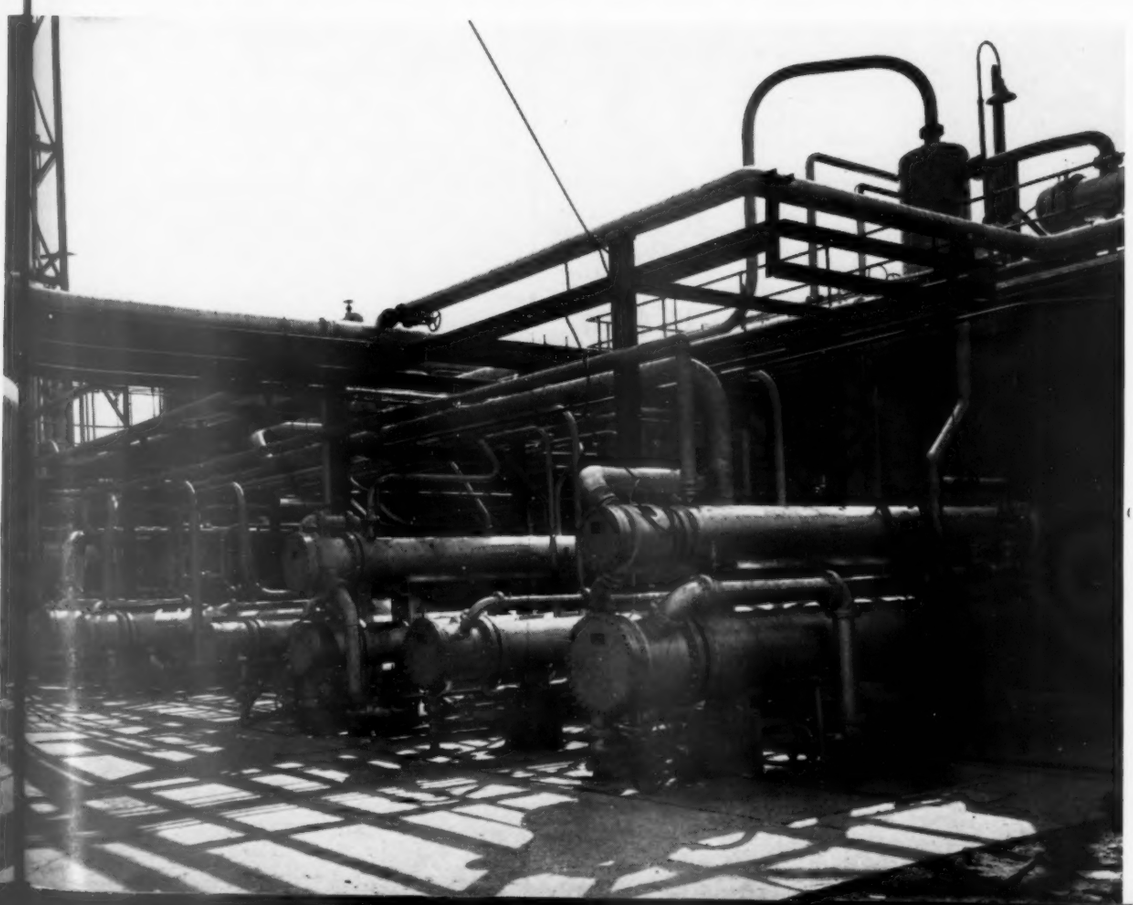
The Lummus heater at the right is one of the features of this installation with a light weight wall and arch construction, a convection section which produces economically high pressure steam, and a diffusion baffle arrangement which effects uniform evacuation of products of combustion over the entire area of the combustion chamber roof. This heater is multi-chamber installation for control in heating and soaking section, and utilizes floor gas firing for uniform heat distribution. The heater is raised to a height of 6 ft. 6 in. to enable the operator to walk underneath it for burner control. The entire heater is encased with sheet plate, so that there is no air infiltration through the hearth and heat flow into the foundations is eliminated.

The structure to the left carries the towers and heat exchangers. This unit carriers an extra absorber tower to handle outside refinery gases removing the propanes and butanes which can be processed along with the low octane naphtha charge. The large tower is the bubble tower and evaporator and there is also a stabilizer and another absorber tower.

This polyform unit was started up with an initial run of 65 days, when it was shutdown for inspection and to give operators experience in shutting down and starting up. The Lummus Co., New York, engineered the plant and fabricated much of the equipment.

ble-rel War Plants
n 'Cal Rubber Ingredients





ABOVE — Another recently completed Socony-Vacuum naphtha polyform unit, for the production of high octane number gasoline from low octane heavy naphtha and outside gases. The photograph was taken from the top of the cooling water pump house and shows the pump house in the foreground, Lummus heater in the background, stabilizer at the left rear, low pressure absorber in the left foreground, high pressure absorber to the right, and heat exchangers, condensers and coolers in the structure. This unit had a 69-day initial run.

★

LEFT—Heat exchangers and coolers and piping of a recently completed Socony-Vacuum naphtha polyform unit.

R-317

Oil's Research Put on Wartime Footing To Produce More, Better Products

THE research now being carried on in the petroleum refining field is almost entirely directed at aiding the oil companies to turn out greater quantities of improved wartime petroleum products. The more general and abstract research investigations which do not have a concrete bearing on the war program have been laid away "for the duration".

The extent to which the oil industry's research work has been put on a full war footing is indicated by the reports of investigations presented at the sessions of the Division of Petroleum Chemistry Sept. 10 at the fall meeting of the American Chemical Society in Buffalo, and at sessions of other divisions. The research activities reported on included, among others:

New data on the physical characteristics of the types of hydrocarbons now being processed which, the authors pointed out, will enable fractionators, stabilizers and other equipment to be designed to meet actual operating conditions more closely. This will provide for the conservation of steel and other materials in the construction of plants.

Studies of reactions of hydrocarbons under various conditions of heat and pressure, and in the presence of acids, which will make possible, in the new processes coming into use, the better separation of the desired fractions and more efficient recovery of acid used, among other advantages.

Investigations of the molecular structure and properties of the synthetic rubbers, to supply data regarding their processability in the equipment which has been used for natural rubber.

Studies of "crankcase catalysts" and other conditions that effect the stability of lubricating oils in interial combustion engines, which may lead to the manufacture of oils that will withstand more severe service.

Indicative of the expansion that is taking place in the field of petroleum chemistry is the fact that papers on this subject were given before other divisions of the society. Heretofore they have mostly been confined to the petroleum division. Future possibilities in the manufacture of chemicals from petroleum were also discussed by speakers at general sessions.

Following are abstracts of papers pertaining to petroleum refining and manufacturing presented before the Petroleum Chemistry section and other divisions, at the Buffalo meeting of the A.C.S.:

Affecting Plant and Equipment Design

Liquid Capacity of Bubble Cap Plates

By Drs. M. H. Hutchinson, A. J. Good and W. C. Rousseau of E. B. Badger & Sons Co., Boston; Sept. 10, before Division of Petroleum Chemistry.

Data of practical application in designing fractionating towers was presented on the liquid carrying capacity of bubble cap plates. Most of the previously published data used in determining tower size has been based on vapor carrying capacity. Since the function of fractionating towers is to separate fluids into their various components by forcing a contact between vapor and liquid in a number of steps, represented by bubble cap plates, the design revolves largely around the capacity of the plate for handling both vapor and liquid.

While bubble caps are made in a number of shapes and sizes, those most commonly used today are round caps. Since liquid must flow across these caps, resistance to liquid flow is influenced by the number and spacing of the caps. This resistance reflects itself in a damming-up of liquid, which may be great enough to smother some of the caps and prevent them from bubbling, thus reducing the effectiveness of the tower.

It has been found possible, these authorities stated, to increase the liqund capacity of a tower by proper selection of caps and spacing, by lifting caps higher from the plate, increasing the depth of liquid through which bubbling occurs and decreasing the number of rows past which the liquid must flow. The quantitative information presented for one type of cap makes possible design for efficient operation in the most economically built tower using that particular type of cap.

Since the demands of construction in the new aviation gasoline, butadiene, toluene and other plants of the oil companies, as well as other defense industries, are for towers of larger diameters with more plates, it is important in conserving strategic materials that towers be designed to fulfill their purpose effectively with the most economical use of metal. The opportunity for an engineer to use available data instead of relying on guess work permits him to design towers that will safely carry high loads and that may effect a saving of up to 50% in sheet metal requirements.

° ° °

Catalytic Vapor-Phase Alkylation of Benzene with Ethylene

By Dr. W. A. Pardee, Gulf Research and Development Co., Pittsburgh; and Dr. B. F. Dodge, Yale University; Sept. 9, before Division of Industrial and Engineering Chemistry.

Results were presented of research into the reactions of benzol and ethylene in the gaseous state in the presence of a catalyst to produce ethylbenzene, the chief chemical intermediate used in the production of styrene, one of the materials for Buna-S rubber. This substance for some time has been produced by a reaction in the liquid state between benzol and ethylene by the use of a catalyst such as aluminum chloride.

In the research on alkylation in the gaseous state, numerous catalysts were investigated, as well as the effect of such operating variables as time, pressure and temperature. It was said that good yields were obtained under certain conditions.

This investigation is considered timely in view of the need to increase the production of ethylbenzene to make styrene for the synthetic rubber program. In addition to being produced from benzol and ethylene, it was said that considerable quantities may be produced from agricultural alcohol and benzol, even though this method is more expensive. It was stated that the synthetic rubber program when in full swing will require the production of some 234,200 tons of styrene annually. Styrene also serves as raw material for polystyrene plastics of crystal clarity which are being produced in increasing quantities for ornamental purposes and also for making vital electrical equipment.

° ° °

Phase Equilibria at High Temperatures

By Robert R. White and George G. Brown of the teaching staff of the chemical engineering department, University of Michigan; Sept. 10, before the Division of Petroleum Chemistry.

This investigation presented experimental liquid-vapor phase equilibrium data for petroleum fractions boiling from 95 to 750 deg. F. at temperatures from 300 to 820 deg. F., and at pressures from 50 to 700 lbs. per sq. in. The data have been used to extend the existing data to hydrocarbons having boiling points up to 925 deg. F., at temperatures from 0 to 1000 deg. F., and at pressures from 1 atmosphere to 1000 lbs. per sq. in. Relationships have been developed whereby equilibrium data in the region of the critical point can be estimated. It is now possible by means of these data to compute vapor-liquid phase equilibria for complex mixtures for most of the commercial range of temperatures, pressures and compositions.

The importance of the data presented is to be seen from the fact that vaporization data on the hydrocarbons of greater molecular weight than heptane are exceedingly meagre and consist mostly of work on atmospheric vaporizations of various distillate oils to evaluate deviations from Raoult's law. This data has only slight application to commercial problems. In the important range from 500 deg. F. upward, there are no published data which can be used to calculate the quantity and compositions of liquid and vapor in equilibrium. Further, the extrapolation of existing data to obtain estimated data in this region is said to be a practical impossibility.

At the present time, reliable vaporization data which can be applied to commercial problems of design and operation of equipment are limited to the natural gasoline hydrocarbons, methane through heptane, over a range of temperatures from 40 to 500 deg. F.

and pressures from 10 to 1000 lbs. per sq. in. This data is useful in the design of stabilizers, absorbers and strippers, and in the determination of production rates and separating pressures of crude oil-natural gas mixtures from the wells, and in related problems.

In recent years, the development of cracking, polymerization and high temperature processing has focused increased attention on the importance of data on the vaporization of hydrocarbons in the temperature range from 500 deg. F. upward for materials boiling from -258 to 1000 deg. F. A knowledge of the temperature, pressure and composition relationships of coexisting liquid and vapor phases is essential to efficient design and operation of stabilizers, absorbers, strippers, condensers, reaction chambers, vaporizers, storage tanks, furnaces, pipe lines and other equipment.

° ° °

Surface Tensions of Methane-Propane Mixtures

By Donald L. Katz and Charles F. Weinaug of the teaching staff of the department of chemical and metallurgical engineering, University of Michigan; Sept. 10, before Division of Petroleum Chemistry.

Measurements of surface tension were made on different composition methane-propane mixtures under conditions which showed how the surface tensions were related to the critical point of the mixtures. A formula was devised which made it possible to compute the surface tension of other mixtures under pressure from a knowledge of their composition.

These methods of computing surface tension have been useful in determining the correct diameter of a fractionating column preparing ethylene, and they may be useful in the proper design of commercial distillation columns.

While in natural gas the proportion of methane is usually 50-90%, and of propane 5-15%, if the proportions are reversed, mixtures of methane and propane become part liquid and part gas at ordinary temperatures and pressures from 400 to 1500 lbs. per sq. in. The measurements in this investigation were made under these conditions in a glass-windowed cell which could withstand the pressure.

The cell had an internal cross section of about 1 sq. in. and was about 10 in. tall. A capillary tube was held in the space by metal springs. Methane and propane stored in pressure cylinders were transferred to this cell through steel tubing, until the cell was partially filled with liquid and the remainder was gas. The liquid rose inside the capillary tube higher than on the outside. This rise was measured by means of a traveling telescope attached to a micrometer.

Measurements were made at different composition mixtures at several temperatures and pressures. The most interesting measurements were those taken at successively high pressures. Under these conditions the gas phase compresses and becomes more dense while the liquid phase becomes less dense due to the dissolved gaseous constituents. At some high pressures the gas phase becomes identical with the liquid phase and the interface or meniscus between the gas and liquid disappears.

° ° °

Liquid-Vapor Equilibrium Compositions In the HCL-n-Butane System

By Drs. J. H. Ottenweller, Clark Holloway, Jr., and Whitney Weinrich of the chemical engineering laboratory, Gulf Research and Development Co., Pittsburgh; Sept. 10, before Division of Petroleum Chemistry.

Compositions of equilibrium vapor-liquid mixtures of hydrogen chloride and butane, in the isomerization of normal butane into isobutane, are presented in tabular form, and also graphically as pressure-composition and as equilibrium constant-pressure diagrams. These data are of practical application in the design of equipment for the recovery of hydrogen chloride used in the isomerization process.

The compositions were determined at temperatures of 70 deg., 120 deg. and 180 deg. F. for pressures below 550 lbs. per sq. in.

In discussing the need for converting normal butane into isobutane, one of the materials for producing isooctane for aviation gasoline, this paper stated that the present military program calls for about 10,500,000 gal. of 100-octane gasoline a day; and this will have to be expanded if a cargo-plane program is launched.

° ° °

The Solubility of Hydrogen in n-Butane

By Drs. E. E. Nelson and W. S. Bonnell of the chemical engineering laboratory, Gulf Research and Development Co.; Sept. 10, before Division of Petroleum Chemistry.

In the conversion of n-butane into isobutane, it was found upon research that a certain amount of the butane charge was "cracked" or decomposed, lowering the yields. The possibility was advanced that the presence in the n-butane of a certain amount of hydrogen might decrease this cracking. Since the design engineer must know how much hydrogen can be dissolved in n-butane under different conditions of temperature and pressure, research was undertaken to obtain these data, the results being presented in this paper.

The solubility of hydrogen in n-butane was determined at temperatures of 23.9 deg., 82.2 deg. and 115.6 deg. C. and at pressures up to 100 atmospheres. At pressures below 30 atmospheres, it was found that solubility decreases with increase in temperature. From 30 to 40 atmospheres, temperature has very little effect on solubility, and above 40 atmospheres solubility increases with increase in temperature over the temperature range investigated.

At concentrations of hydrogen above 3 mole percent, the shapes of the P-T bubble-point curves derived from the solubility data suggest the existence of a region of isobaric retrograde condensation at temperatures far below the critical region of the mixtures.

"By All Means, Too, Watch Petroleum"

So said Dr. Charles M. A. Stine, vice-president of DuPont and adviser on research and development, before the American Chemical Society in Buffalo Sept. 7, in addressing American chemists as "molders of a better destiny." After speaking about the part petroleum chemists in this country had played in developing superior fighting aviation fuels, he said:

"Let us glance at another phase of petroleum chemistry. A barrel of crude oil contains literally thousands of chemical compounds. The chemist has long been fascinated by the possibility that almost anything under the sun might be created with these chemical building blocks of hydrogen and carbon; that simply by the addition of oxygen and other elements in the proper combination, he might obtain new alcohols, esters, acids, solvents, perfumes, pharmaceuticals and organic synthetics of every type.

"Catalytic cracking processes and adaptations of them, brought very recently to high stages of performance, are now leading toward this goal and taking petroleum chemistry into a realm once exclusive to coal-tar chemistry." . . .

"With almost equal facility, the petroleum chemist can give us ethylene, on the one hand, or benzene on the other, and supply them in quantities measured in hundreds of tons daily. This feat might be likened to drawing wine or water at will from the same cask, or getting beef or pork from the same animal, inasmuch as ethylene and benzene are members of quite different chemical families. Practically, they are employed in such diverse uses as the manufacture of styrene plastics, both the Buna and Thiokol type of synthetic rubbers, drugs, dyes and nylon. Moreover, acetylene can be produced from refinery gases to furnish the principal intermediate in the manufacture of Neoprene."

Reduction of Ash Content of Residual Fuel Oils with Boric Acid

By E. T. Scafe, K. F. Hayden and V. A. Kalichevsky of Socony-Vacuum Oil Co.; Sept. 10, before Division of Petroleum Chemistry.

A process is described for removing the ash-forming constituents from the class of residual fuel oils known as "soda tar", in which are concentrated the sodium salts resulting from the treatment in distillation of crudes containing napthenic acids with sodium hydroxide in order to improve the quality of the distillate fractions and minimize corrosion of equipment. When they are burned, the high ash content of these fuel oils causes the deposit of an alkaline residue that has a deleterious effect on conventional furnace refractories.

In this new process, a mixture of soda tar and boric acid is vigorously agitated at about 400 deg. F. under 250 lbs. per sq. in. pressure, and the reaction products are separated by settling. The boric acid may be recovered from the boric acid sludge for reuse in the process by simple acidification, crystallization and filtration. No emulsification difficulties are encountered because of the use of an anhydrous reagent in a molten state. The boric acid does not react chemically with the hydrocarbon components of the oil.

It is claimed that use of this process will permit the refiner to produce high grade industrial fuel oils from inferior grade materials which can now be disposed of only in blends with other oils.

° ° °

Ketones by Condensation of Acid Anhydrides with Olefins

By A. C. Byrns and T. F. Doumani, research department, Union Oil Co. of Calif.; Sept. 10, before Division of Petroleum Chemistry.

A method was described for the synthesis from petroleum of ketones, a group of oxygen-containing hydrocarbon compounds. Olefins produced in cracking operations are reacted with an acid anhydride, in the presence of a catalyst such as zinc chlorides or sulfuric acid. The method may be extended to condensation of various acid anhydrids with olefins. The ketones, now commercially de-

rived from alcohol, find application in industry as solvents, dyes, ingredients in perfumes, among other uses. Polymer gasoline, obtained from cracking plant gases by polymerization with solid phosphoric acid, has been shown to be a suitable source of olefins. The experiments reported were in a pilot plant.

° ° °

Research on Properties of Hydrocarbons

The Ultraviolet Absorption Spectra of a Series of Dienes

By Emma P. Carr and Lucy W. Pickett, Mount Holyoke College; Sept. 10, before Division of Petroleum Chemistry.

The ultraviolet absorption spectra of eleven aliphatic and three cyclic dienes have been examined. These include ten hydrocarbons, in which the double bonds are conjugated; two where they are adjacent; and two with isolated double bonds. The characteristic spectra of each type of compound is discussed. The aliphatic dienes show their most characteristic absorption below 2300 A, and microphotometer records of the spectra of eight conjugated dienes in this region are given and discussed in relation to the spectrum of butadienes. These hydrocarbons include two pentadienes, three hexadienes, and two dienes containing seven and eight carbon atoms. A brief theoretical interpretation of these spectra is given.

In a previously published research study of the absorption spectra of simple hydrocarbons by the same group, the results for 18 monoolefins were summarized.

° ° °

Relation of Refractive Index, Density, and Molecular Weight for All Saturated Hydrocarbons

By M. R. Lipkin and C. C. Martin, Sun Oil Co., Sept. 10, before Division of Petroleum Chemistry.

An equation is presented,

$$n = \frac{69{,}878d - .4044ad - .797a + 136.566}{5.543d - .746a + 126.683}$$

where n = refractive index at 20°C. for D line of Na, d = density at 20°C., a = 10^5 x temperature coefficient of density at 20°C., from which it is possible to calculate refractive index (n_D^{20}) within + / − 0.001 for all saturated compounds or mixtures of such compounds such as hydrogenated petroleum fractions.

The temperature coefficient of density has been shown by Lipkin and Kurtz to be related to molecular weight. It has been possible to calculate the refractive index from density and molecular weight almost within the limits of experimental accuracy.

This method of calculating refractive index is said to be more accurate than the previous work of other investigators on density, refractive index and molecular weight relations.

° ° °

The Density and Transition Points of the Straight Chain Paraffin Hydrocarbons

By Wm. F. Seyer, Ralph F. Patterson, and John L. Keays, University of British Columbia, Sept. 10, before Division of Petroleum Chemistry

In a previous communication to the Petroleum Division, the density and transition points of diethyl C_{32} H_{66}, were presented. The same investigation has been extended to the even-numbered paraffin hydrocarbons beginning at $C_{16}H_{34}$ and up to $C_{34}H_{70}$. The odd-numbered hydrocarbon $C_{29}H_{60}$ has also been studied. The same technique as described in the

(*Continued on page R-322*)

Oil Chemistry Given Tremendous Impetus By Loss of Natural Rubber Supply

(An Editorial Contributed by a Petroleum Chemist)

"The Japs underestimate our technical abilities if they think taking natural rubber from us will defeat us."

So spoke Dr. Albert L. Elder, of the War Production Board, in reporting to American chemists on our progress in production of butadiene for rubber synthesis before the American Chemical Society in its semi-annual meeting at Buffalo in September.

Throughout the long and varied program of this largest scientific organization in the world could be seen at every turn the overshadowing effect the fight for synthetic rubber is having on research activity in almost every branch of chemical science, including particularly the petroleum field. Not only in the production of butadiene, styrene, acrylonitrile, acrylates, isobutylene is American petroleum chemical industry crowding into a few months a development which normally would require as many years to perfect. In every allied branch a similar "learn to make it or bust" attitude is unescapable. The chemical manufacturing researchers are driving full-power to produce the kind of chemicals required for plasticizers, inhibitors, accelerators, and all the other products needed to synthesize satisfactory rubber. Synthetic rubber requires somewhat different products for these purposes from those long employed for natural rubber.

We have good products for these new purposes, and new ones are being developed at what, in peacetime would be unbelievable speeds.

Complicated organic compounds are being synthesized, their specific properties are being varied by introduction of various groups into their molecular structure by means old and new, methods dear to the heart of the organic synthesist, to discover the right combination of effects so indispensable to the making of a satisfactory product. Every known trick and process known to science is being tried to make more and better intermediates for rubber; new processes are being developed at a rate and with results to gladden and hearten the hard-driven chemist and the manufacturer, to buoy up the courage of the often bewildered American public.

A dozen ways are known now to make butadiene; nearly a hundred actual and theoretical ways exist for its synthesis. In the production of butadiene huge quantities of by-products are formed; providing for the utilization of the olefins, aromatics and other hydrocarbon by-products is a greatly accelerated stimulus to the chemist's inventiveness, probably unparalleled in world chemical history.

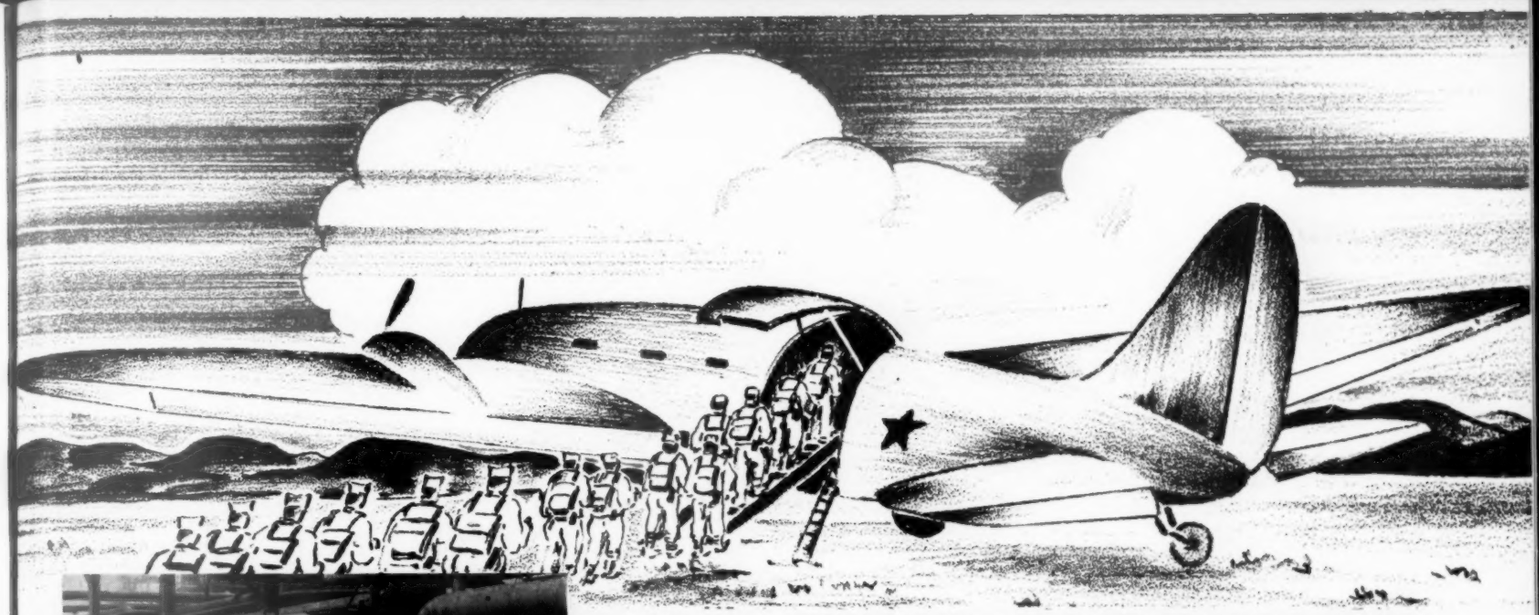
Styrene can also be made in numerous ways, several of which are forging to the front as commercial possibilities or actualities, stated Dr. Willard Dow, the head of Dow Chemical Co. Ethylbenzene is cracked thermally or catalytically to yield high percentages of styrene. Benzene in 95% alcohol or with ethylene from cracked gases and a phosphoric acid or aluminum chloride catalyst show excellent results, he said. Introduction of catechol derivatives and other inhibitors have successfully stymied the polymerization of styrene, one serious difficulty in its production and handling.

Three long sessions filled with the recent results of research on synthetic rubber itself and its polymerization showed how terrific is the pace the rubber chemists have set. Study of characteristics of the synthesized materials to find out how to fit it to its job; details of treatment and the effect of varying temperatures, times, auxiliary ingredients on properties so that rubber may be "tailor-made" for any given purpose; making new carbon blacks and the scientific dissection of carbon black and other fillers to determine what kinds and properties form the best rubber; all these and hundreds of other researches are in progress 168 hours of every week. The aggressive rubber chemist knows no work hour limitations except his own endurance. And that is how wars are won.

The petroleum chemist is just as busy. Stopped from discussing at the meeting new processes for making strategic products by the necessary secrecy limitations in wartime, they exchanged new methods for study of products, for evaluating, testing, measuring. The relatively new principle of ultraviolet absorption spectra may be employed in the analysis of mixtures of dienes and their admixture with other liquids to an accuracy degree of about 1%, one group of experimenters stated.

Employing hydrochloric acid in hydrocarbon solution in the new isomerization processes for making aviation superfuel components, equilibrium data on these solutions have been worked out and methods for thus employing the catalyst promoter are improved. Effects of different metal and other oxidation catalysts, as copper, iron and lead, on lubricating oil stability under the ultra-severe service conditions now imposed on oils are being studied, as an aid to the development of methods for eliminating these deleterious catalytic effects.

But the most heartening thing seen in all this assembly is the terrific pace set for himself by the American chemist and his tens of thousands of colleagues to meet the crisis war has brought to our country. The chemist is doing his work, too busy and happy to bother with whining or with fault-finding.



THE BEST DEFENSE

★ ★ ★ *a good offense*

This adage is especially true in the protection of refinery equipment against damage from salty charging stocks - - - purely defensive measures not only are insufficient, they are very costly.

Prevent this

Three of the major difficulties attributed to salts are *plugging*, *coking*, and *corrosion*. While these troubles probably cannot be blamed entirely on the presence of salt in the refinery charge - - - it is accepted widely that salt renders such troubles much more malignant.

With salt plugging, the "defensive" measures are frequent shut downs for washing out, and in many cases, extensive drilling out and exchanger tube replacements. Petreco Desalting, by its high percentage removal, eliminates salt plugging.

... with Petreco

Where salt is present, the coke is often extremely hard and difficult to remove. The "defensive" measures against coke involve shutting down for a clean out - - - time on stream is lost, maintenance costs rise, and frequent "drill outs" shorten tube life. Petreco Desalting may not *prevent* coking, but it has been found that coke from desalted oil is softer, more easily removed, and slower to accumulate.

Defensive measures against corrosion due to HCl evolution from salts call for neutralizing agents and the use of alloy metals - - - these measures are costly, decreasing in availability and do not attack the problem at its source. Petreco Electric salt removal eliminates the cause, reduces evolved HCl to a minimum, and makes possible drastic cuts in ammonia usage.

If you are charging salty crude and not obtaining the maximum removal percentage possible, get in touch with Petreco for analysis and a survey - - - there is no charge for this service.

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA

5121 So. Wayside Drive, Houston, Texas
Edison Building, Toledo, Ohio
530 West Sixth Street, Los Angeles, California
Representatives in Principal Fields and Refining Centers

PETRECO

DESALTING DEHYDRATING

Journal of the American Chemical Society, 61, 1114 (1939), was used. Most of the hydrocarbons were crystallized 20 times. Melting points could not be given by any single equation. Three equations are necessary, of the type log n-2 = a + bt, from 7-16, 16-33, 33-44 carbon atoms.

$C_{16}H_{34}$ shows no transition points. $C_{18}H_{38}$ to $C_{20}H_{42}$, $C_{22}H_{46}$ show two transition temperatures on cooling but no definite ones on heating. $C_{21}H_{50}$ and $C_{26}H_{54}$ show no transition points on cooling and on heating, but the points on heating depend upon rates of temperature increase.

$C_{28}H_{58}$, $C_{30}H_{62}$, $C_{30}H_{62}$, $C_{32}H_{66}$, $C_{34}H_{70}$, and $C_{29}H_{58}$ all show transition points upon cooling as on heating.

Research Papers on Lubricating Oils

Catalysis of Lubricating Oil Oxidation

By R. G. Larsen and F. A. Armfield of the Shell Development Co.; Sept. 10, before Division of Petroleum Chemistry.

The catalytic effect of iron, copper and lead in the bulk and dissolved form on 3 crankcase oils broadly representative of those obtainable from Pennsylvania, Mid-Continent and California crudes was studied in detail, as a means for a better understanding of the stability of motor oils.

The variations in the catalytic susceptibilities of the oils, as well as in the catalytic activities of the metals with concentration are so great that it was concluded that the indiscriminate use of metal catalysts, either in amount or in type, in oil oxidation tests may be misleading unless the catalysts correspond to those with which the oil comes in contact in the engine. This correspondence cannot be assumed from correspondence in volume ratios of metal surface to oil, since the question of catalytic activity of engine metals still remains.

The most active catalysts proved to be such compounds as iron chloride and bromide and copper chloride and bromide. It was found also that oils themselves varied in their sensitivity to the various catalysts, so that an oil with superior resistance to one catalyst frequently has inferior resistance to another. Study showed that gasoline residues and oxidized oils had little or no catalytic effect.

In an investigation of the catalytic effect of engines on oils, it was found that the oil-insolubles (called crankcase catalysts) which accumulate in engine lubricants are extremely active catalysts. This catalytic activity resides in the metallic constituents, particularly the halides of iron.

° ° °

Photo-electric Color, Part II: A Study of Light Colored Petroleum Products

By J. C. Dean, R. J. De Gray and J. W. Wilson, Jr. of Socony-Vacuum Oil Co., Brooklyn; Sept. 10, before Division of Petroleum Chemistry

This paper describes the use of the photo-electric colorimeter in measuring the color of light colored petroleum products (refined oils, kerosine, solvents, used lubricating oils). The instrument is described as a means for testing color that is more accurate than the present systems employed by oil companies, which depend upon the visual matching of the color of the sample with that of standard discs. It is also pointed out that measurements may be made in terms of red, violet and yellow light content, in accordance with the system devised by the International Committee on Illumination.

The use of the photo-electric colorimeter for the determination of color of lubricating oils has been proposed by Committee D-2 on Petroleum Products and Lubricants of the American Society for Testing Materials, and was accepted as a proposed standard method at the meeting in June of that society. It is to be published, as information only, in the official transactions of the society. A description of the work done by the Socony-Vacuum investigators in measuring the color of lubricating oils with the photo-electric colorimeter was published in the August issue of *Industrial and Engineering Chemistry*, the journal of the American Chemical Society.

The present paper, discussing the same method for measuring the color of refined oils, describes the photo-electric colorimeter. It consists of an incandescent light bulb emitting a beam of light focussed at the center of a sample holder which contains the oil specimen. A portion of light is passed through the oil and is further filtered by means of a colored glass disc. The light which remains is directed upon a photocell or "photo-electric eye." Intensity of this light determines the current generated for activating a galvanometer, from which readings are obtained. The instrument is standardized with colored solutions of pure chemicals and is always set at 100 on the scale, with distilled water in the sample holder. Thus the values are reproducible by more than one instrument and are entirely independent of the operator.

The standardization and reproducibility of tests by the photo-electric colorimeter on refined oils such as solvents and kerosine was determined. Photo-electric color of refined oils can be correlated with color as determined by the Saybolt Chromometer by the use of a suitable conversion curves.

° ° °

Lubricating Oil Detergency

By S. K. Talley and R. G. Larsen of Shell Development Co.; Sept. 10, before Division of Petroleum Chemistry.

Suitable laboratory methods were studied for determining the detergency of lubricating oils, since there has been a lack of simple laboratory tests for this property and it has been necessary to make such tests in engines. Four methods developed in the Shell company's laboratories were described, all of which evaluate the ability of the lubricant to disperse or peptize oil-insoluble materials such as oxidized lubricants or soot.

One method involves adding soot to an oil to be tested, sucking through a glass tube filled with sand and noting the depth of penetration of the soot. The more detergent oils increase the penetration. This test is said to be especially useful for examining diesel lubricants.

The other 3 methods examine the detergent action of oils on their own oxidation products. One test measures the quantity of added solid oxidation products that can be carried through a layer of asbestos. In another test the amount of solids in the oil, as detected by a settling test under high centrifugal force, is measured before and after adding the detergent. An effective detergent so breaks up the solids that they can no longer settle out. In the fourth test, this same breaking up process is detected by the increase in transparency of the oil toward infra-red light.

It has been found possible to use these tests profitably to predict the cleansing action of an oil in engines, providing consideration is made of the type of material most likely to be deposited, as well as the temperature conditions under which the engine operates. In addition to their direct application to engines, which requires further correlation, the tests are useful tools of research in giving quantitative data on many previous speculations on the detergent aspects of lubricating oils.

Properties of Synthetic Rubber Being Studied

Perbunan Properties and Compounding

By R. A. Moll, R. M. Howlett and D. J. Buckly, Esso Laboratories, Standard Oil Development Co.; Sept. 11, before Division of Rubber Chemistry.

Properties of this Buna-N rubber were described, as determined by laboratory research investigations. By means of compounding variations, Perbunan may be made easily extensible or very stiff and hard. Depending on materials added, some compounds have high "bounce"; others have especially good flexibility at minus 40 deg. F. Another type of compounding yields articles which retain their strength and resiliency at elevated temperatures. This synthetic rubber has been found especially useful for some types of hose, gaskets, diaphragms or other parts subjected to contact with petroleum products.

° ° °

Molecular Weights and Intrinsic Viscosities of Polybutenes

By Dr. Paul J. Flory, Esso Laboratories, Standard Oil Development Co.; Sept. 11, before Division of Rubber Chemistry.

Results were presented which have been obtained thus far in extensive theoretical studies being carried on by this organization to determine the actual grouping of atoms in the synthetic rubber molecule. Whereas the chemist working with natural rubber has been accustomed to talking of molecular weights from 100,000 to 200,000, it was demonstrated that at least one of these synthetic materials has a molecular weight running into the millions.

The size of the molecules and the molecular structure directly affects the processability of the rubber, and studies on this subject are of direct importance to rubber compounders concerned with the ability of new synthetic rubbers to process readily in conventional factory equipment.

° ° °

Butyl Rubber Properties and Compounding

By J. W. Haworth and F. P. Baldwin, Esso Laboratories, Standard Oil Development Co.; Sept. 11, before Division of Rubber Chemistry.

It was reported that research has produced some additional types of Butyl rubber that will, on the basis of laboratory tests, be satisfactory for most types of tire and tube service where natural rubber is now being used. Tires made from present commercially produced Butyl rubber, manufactured with the present rubber factory equipment, will give 20,000 miles or better tread life when driven at 40 m.p.h. Inner tubes made by Butyl have been shown satisfactory for light to medium duty truck and bus service.

FROM BLUEPRINT TO REFINERY

service fits specifications

From the time customers plans are received until the finished piece of equipment is set up in their refineries SUN Shipbuilding makes service fit the order.

If the order calls for a change in production facilities, SUN makes the change and service fits the order.

SUN's unlimited flexibility in production and money saving shipping facilities offer every refiner a service that is well worth considering when ordering new equipment.

SUN SHIPBUILDING & DRY DOCK CO.

CHESTER, PENNSYLVANIA

Standard Method is Proposed for Testing Crankcase Oils for 'Varnish' Deposits

MOTOR oil manufacturers, automobile engine builders and fleet operators who maintain their own oil testing laboratories now are provided with a standard method for testing crankcase oils for their tendency to contamination, as evidenced by corrosion of bearings and deposition of so-called "lacquer" or "varnish" on engine parts.

The method is the proposed test for oxidation characteristics of heavy-duty crankcase oils which was accepted for publication, for information only, by the American Society for Testing Materials at its annual meeting in June. Following a period for criticism and any necessary revisions, the test method will probably be accepted by the Society as the official standard and will become accepted procedure for testing oils for heavy-duty service. It may be used by the Army.

This test method, using a standard engine set up in the laboratory, is now being used by the large oil companies, some engine makers including General Motors, and others, as one means for insuring a supply of the most suitable crankcase oils for the buses, trucks and military vehicles driven under today's severe operating conditions. It is considered the last step in testing a motor oil before using it experimentally in vehicles on the road. Where only minor changes in the nature of lubricants are made, authorities believe the method could be accepted in place of proving tests in commercial vehicles, which are more costly and take more time.

While a number of oil concerns and other companies have for some time used standard automobile engines in their laboratories for testing motor oils for service characteristics, there has been considerable variety in the equipment, number of testing hours, and in the method of rating the condition of the engine, following the test run, for deposits on piston heads, cylinder walls and other parts. In the new proposed standard test, the run has been shortened to 36 hours and a uniform method is provided for rating parts with respect to sludge and varnish deposits.

The new test method does not evaluate the "detergent" characteristics of the lubricant, the ability of the oil to hold contaminants in suspension, as evidenced by freedom from the tendency to cause ring or valve sticking or combustion chamber deposits. The test which originated with the Caterpillar Tractor Co. is recommended for determining "detergent" characteristics under engine operating conditions.

The new A.S.T.M. test method, is the work of special committees of the Lubricants Division of the Society of Automotive Engineers to meet the need for a standard method by which production multi-cylinder engines could be used, under carefully controlled operating conditions, to give test results on motor oils that would coincide with the results obtained in service. Joseph A. Moller, chief products engineer, Pure Oil Co., was chairman of the group of oil company lubrication engineers taking part in this work; Harry C. Mougey, technical director, Research Laboratories Division, General Motors Corp., was chairman of the automotive engineers.

Sponsor of the new test method when it was introduced before the A.S.T.M. was that society's Committee D-2 on petroleum products and lubricants.

Oil companies and others who desire to set up the apparatus for making the new proposed test may at present have difficulty in securing the equipment because of shortages of materials. Efforts are now being made in Washington to secure priorities for purchasing engines, dynamometers, instruments and other necessary equipment, on behalf of experimental laboratories engaged in essential war work. The standard Chevrolet engine, dynamometer, instruments, and hookup necessary for the complete installation will cost the oil company around $2500. With working space it will take 6 ft. by 10 ft. on the laboratory floor.

Following is the official text of the proposed method of test as accepted by the A.S.T.M. in June:

Proposed Method of Test for Oxidation Characteristics Of Heavy-Duty Crankcase Oils[1, 2]

This is a proposed method and is published as information only. Comments are solicited and should be addressed to the American Society for Testing Materials, 260 S. Broad St., Philadelphia.

Scope

1. (*a*) This method of test is intended for use in determining the oxidation and bearing-corrosion characteristics (Note 1) of engine crankcase oils designed for use under heavy-duty service conditions.

(*b*) In this method of test a crankcase lubricant is evaluated only in respect to stability or resistance to oxidation, bearing corrosion, and the deposition of intrinsic contaminants resulting from decomposition, oxidation, or other changes that occur in the lubricant in service (Note 2).

(*c*) Other characteristics of a lubricant intended for heavy-duty service, such as freedom from the tendency to cause ring-sticking, valve-sticking, or combustion-chamber deposits, are not evaluated by this test method. The ability of the crankcase lubricant to hold in suspension extrinsic contaminants is not determined in this engine oxidation test. The so-called "detergent" characteristics of a lubricant, which must be considered in connection with lubricants intended for use in compression-ignition engines, are not evaluated by this method of test.[3]

NOTE 1.—In evaluating crankcase oils for heavy-duty service, several factors, in addition to the conventional inspection data, must be considered; namely, stability or resistance to oxidation, resistance to bearing corrosion, and prevention of engine deposits.

NOTE 2.—The depreciation of an oil in service results from contamination from two major sources:

(1) Sources external to the lubricating system. These extrinsic contaminants, including products of combustion from the combustion zone, depend upon the design, mechanical condition, and specific conditions under which the engine is operated. Extrinsic contaminants may vary in their effect upon the lubricating oil and its final condition.

(2) Sources inherent in the lubricating system and in the crankcase oil. These intrinsic contaminants result from changes in the oil and therefore depend upon the type and quality of the crankcase oil as well as upon the operating conditions.

Apparatus

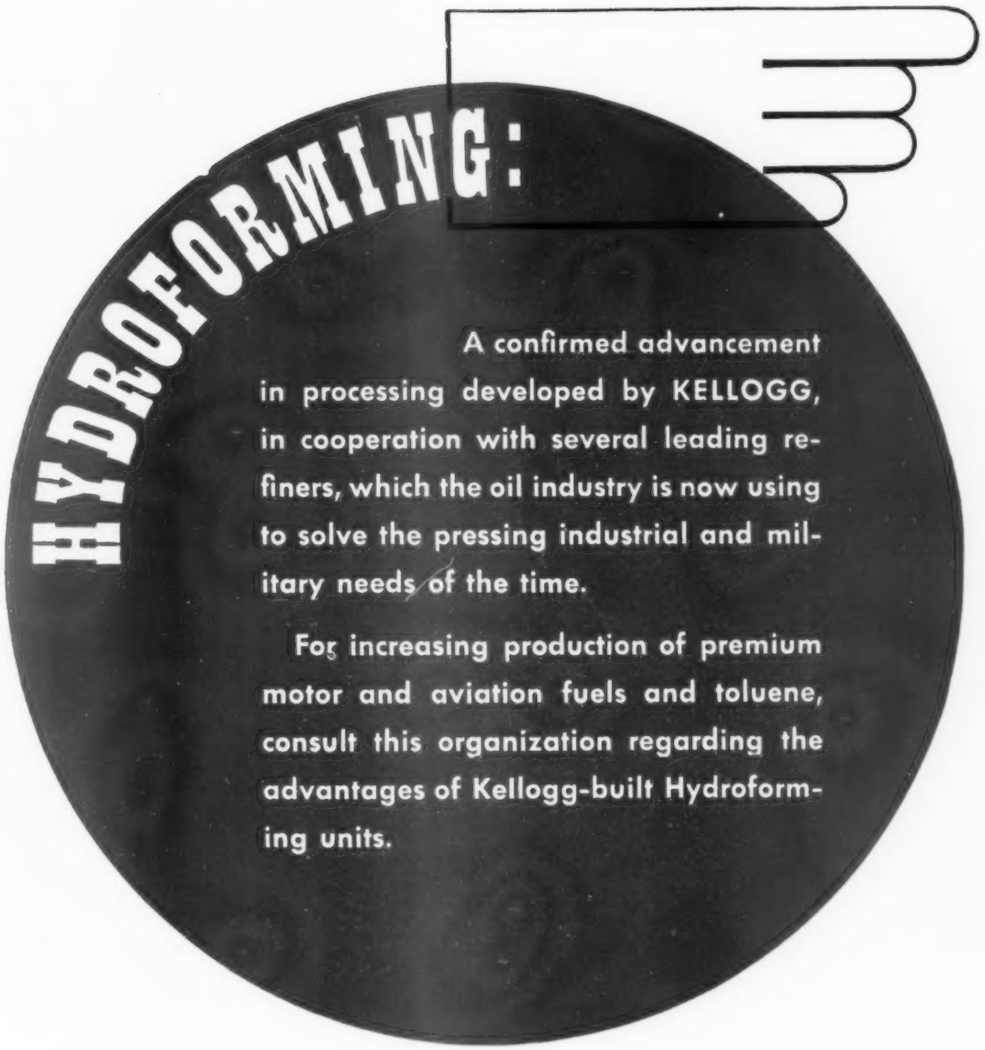
2. The engine described in Appendix I shall be used without modification for determining oxidation and bearing-corrosion characteristics of heavy-duty crankcase oils.

(Note—Appendix I, Apparatus, which prescribes the engine and loading and accessory equipment used in the test, is not published here. Nor are Appendix II, Run-In Schedule; Appendix III, Cleaning Engine Parts; Appendix IV, Air-Fuel Ratio; Appendix V, Insoluble Matter in Used Crankcase Oils; Appendix VI, Engine Test Log Sheet; Appendix VII, Suggested

[1] This proposed method is under the jurisdiction of the A.S.T.M. Committee D-2 on Petroleum Products and Lubricants.

[2] Published as information, June, 1942.

[3] The Caterpillar series of tests is recommended for determining "detergent" characteristics under engine operating conditions.


HYDROFORMING:
A confirmed advancement in processing developed by KELLOGG, in cooperation with several leading refiners, which the oil industry is now using to solve the pressing industrial and military needs of the time.
For increasing production of premium motor and aviation fuels and toluene, consult this organization regarding the advantages of Kellogg-built Hydroforming units.

KELLOGG

DESIGN, CONSTRUCTION and LICENSING

- Catalytic Processes for Cracking, Hydroforming, Reforming, Dehydrogenation, Alkylation, Desulphurization
- Gasoline Products Company, Inc., Pyrolytic Cracking
- The Polymerization Process Corporation, Thermal and Catalytic Polymerization
- JUIK Processes for Lubricating Oil Refining with Propane and Phenol Deasphalting • Dewaxing • Solvent Extraction and Acid Treating Plants

THE M. W. KELLOGG COMPANY • JERSEY CITY, NEW JERSEY • 225 BROADWAY, NEW YORK
Los Angeles: 609 South Grand — Tulsa: Philtower Building

Catalytic Cracking Continuous Process
Hydroforming
Catalytic Polymerization
Alkylation
Thermal Cracking
Thermal Polymerization
Thermal Reversion
JUIK Processes for Lubricating Oil Refining

Report Form. This data, complete with the text of the proposed method of test, will be supplied on request by the American Society for Testing Materials, 260 S. Broad St., Philadelphia—Ed).

Reference Oils

3. Reference oils[4] shall be employed for standardizing engine operation and for bracketing the crankcase oil under test.

Standard Operating Conditions

4. The engine shall be operated under the following standard conditions:

(*a*) *Engine Speed.*—3150 ± 25 rpm.

(*b*) *Load.*—30 ± 1 hp. (uncorrected).

(*c*) *Total Operating Time.*—36 hr. (Note 1) (see Section 12*e*).

NOTE 1.—The test may be terminated in less than 36 hr. if excessive oxidation develops.

(*d*) *Spark Advance.*—52 ± 5 deg.

(*e*) *Coolant Outlet Temperature.*—200 ± 2 F.

Coolant Inlet Temperature, min.—190 F.

(*f*) *Oil Temperature*:

S.A.E. 30 grade	280 ± 2 F.
10W or S.A.E. 10 grade	265 ± 2 F.

(*g*) *Air-Fuel Ratio.*—14.5 ± 0.5 to 1.

(*h*) *Cam Angle.*—39 deg. If cam angle cannot be measured, set breaker-point gap to 0.018 in.

(*i*) *Spark-Plug Gap.*—0.040 in.

(*j*) *Valve Clearances, Hot* (Note 2):

Inlet	0.010 in.
Exhaust	0.020 in.

NOTE 2.—The valve clearance shall be checked at the start and again at 16 hr. and at the end of the 36-hr. test period.

(*k*) *Exhaust Back Pressure.*—1.0 ± 0.5 in. of mercury.

PROCEDURE

Run-In of New Engine

5. A new engine should be run-in in accordance with the run-in schedule described in Appendix II.

Cleaning

6. Engine parts should be thoroughly cleaned prior to each test in accordance with the cleaning schedule described in Appendix III.

[4] The use of a group of oils, on which performance in service has been established, as reference oils for bracketing unknown oils is discussed in detail in papers by H. C. Mougey and J. A. Moller, "The Testing of Heavy-Duty Motor Oils," *Proceedings*, Am. Petroleum Inst., Vol. 22, Part III, pp. 100 to 121 (1941).

The 4 reference oils referred to above may be purchased in required lots through the Society of Automotive Engineers, 29 W. 39th St., New York. Conventional oil inspection data for the oils is as follows:

Oil	B-1	B-2	B-3	B-4
Gravity	24.3	30.1	29.1	22.5
Flash, °F.	425.	475.	480.	415.
Fire, °F.	475.	435.	450.	455.
Vis. at 100°F. (SSU)	584.	411.4	434.5	527.
Vis. at 200.°F. (SSU)	60.2	60.4	60.2	55.5
Vis. Index	57.	106.	99.	34.
Color (R)	2.25	9.25	6.	15.
Conradson Carbon (%)	0.29	0.11	0.46	0.039
Pour, °F.	—15.	+15.	—15.	—25.

Reconditioning

7. (*a*) The engine shall be thoroughly reconditioned after each run. All parts shall be inspected, and defective or worn parts shall be replaced.

(*b*) The engine shall be maintained so that the oil consumption shall be within the following limits:

S.A.E. 30 grade	0.07 to 0.12 qt. per hr.
10W or S.A.E. 10 grade	0.08 to 0.13 qt.per hr.

Piston Rings

8. New piston rings shall be installed prior to each test run.

Bearings

9. (*a*) Main bearings and babbitt connecting-rod bearings shall be adjusted to the clearance prescribed in Appendix I.

(*b*) Copper-lead test bearings should be installed initially in connecting rods Nos. 3 and 4 and shall be fitted within the clearance prescribed in Appendix I. After each test run the copper-lead bearings should be shifted to connecting rods Nos. 1 and 6, or Nos. 2 and 5 and the cycle continued, to minimize wear and early replacement of the crankshaft.

(*c*) The copper-lead bearing halves shall be weighed individually on an analytical balance to the nearest 0.01 g. before being installed in the engine.

Fuel

10. (*a*) The fuel used in the engine shall conform to the following requirements:

Test	Requirement	A.S.T.M. Designation [a]
Octane number, min.	72	D 357
Sulfur, max., per cent	0.04	D 90
Lead ml. of tetraethyl lead per gal.	2.5 to 3.0	D 526

[a] These designations refer to the following methods of the American Society for Testing Materials:
Tentative Method of Test for Knock Characteristics of Motor Fuels (A.S.T.M. Designation: D 357),[5]
Tentative Method of Test for Sulfur in Petroleum Oils by Lamp Method (A.S.T.M. Designation: D 90),[6] and
Standard Method of Test for Tetraethyl Lead in Gasoline (A.S.T.M. Designation: D 526).[7]

(*b*) Fuel from the same source of supply shall be used in any series of tests in which a crank case oil is being compared or bracketed with a group of reference oils.

Run-In Schedule for Reconditioned Engine

11. (*a*) After reassembling, the engine shall be run-in, prior to each test run, in accordance with the following schedule:

(1) Fill crankcase with a highly refined, uninhibited and uncompounded, mineral oil having a high viscosity index (S.A.E. 20 grade).

(2) Run 1 hr. at approximately 1000 rpm. with approximately 5 hp. output.

(3) Run 1 hr. at approximately 1500 rpm. with approximately 10 hp. output.

(4) Run 2 hr., gradually increasing speed and load to approximately 2200 rpm. and 25 hp. output.

(5) Drain crankcase and refill with the crankcase lubricant under test.

[5] 1942 Book of A.S.T.M. Standards, Part III.
[6] *Ibid.*
[7] *Ibid.*

(6) Run 20 min. at 2000 rpm. with 15 to 20 hp. output.

(7) Run 40 min. at 2000 rpm. with 25 hp. output.

(8) Run 3 hr. at 3000 rpm. with 30 hp. output.

(9) Drain crankcase.

(*b*) During the run-in period the coolant and crankcase-oil sump temperatures shall be maintained within the following limits:

Coolant outlet temperature	170 ± 5 F.
Oil temperature, max.	225 F.

Operation of Engine during Test

12. (*a*) The crankcase shall be filled with 4 qt. of the crankcase lubricant to be tested (Note).

NOTE—The original 4-qt. of oil used and the 1-pt. additions specified during the test period may be made on a weight basis.

(*b*) The standard operating conditions prescribed in Section 4 shall be observed.

(*c*) The engine shall be operated continuously for not less than 8 nor more than 16 hr. in any one test period. The engine shall be stopped and remain idle for not less than 8 hr. between test periods. A test period of less than 8 hr. may be employed at the start and at the end of the 36-hr. test period.

(*d*) At the start of each test period the engine shall be run for 10 min. at 2000 rpm. with 15 to 25 hp. output, or until the crankcase-oil sump temperature reaches 150 F. The speed shall then be increased to 3150 rpm.

(*e*) The test period shall be determined from the time the crankcase-oil sump temperature reaches 280 F. for the S.A.E. 30 grade and 265 F. for the 10W or S.A.E. 10 grade, and shall be timed only for the periods during which the engine is operated at the prescribed crankcase-oil sump temperatures.

(*f*) The crankcase oil shall not be drained during the 36-hr. test period.

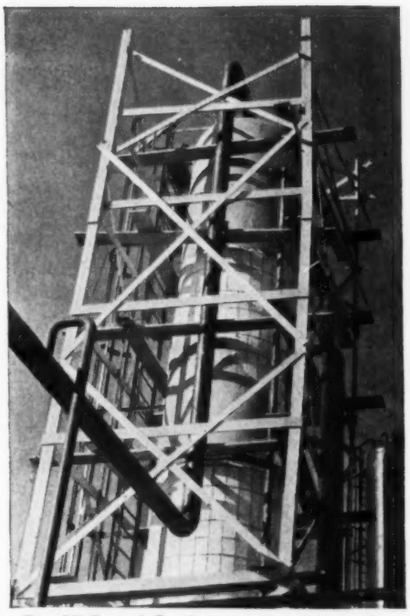
(*g*) One pint of fresh oil shall be added to the crankcase every 4 hr. during the 36-hr. test period. The addition of 1 pt. of oil at the 8-hr., 16-hr., and 24-hr. intervals shall be made as required in Paragraph (*h*).

(*h*) At the 8-hr., 16-hr., and 24-hr. intervals, two ½-pt. samples shall be withdrawn from the oil-sampling cock. The first ½-pt. sample withdrawn shall be returned to the crankcase. The second ½-pt. sample shall be retained as the sample for analysis. After withdrawing these samples, the engine shall be shut down and allowed to stand 1 min., at which time the level of oil in the crankcase shall be measured by the dipstick. If the oil level is less than 3½ qt., fresh oil shall be added to bring the level to 3½ qt. If the oil level is more than 3½ qt., the engine shall be started and the excess amount of oil above 3½ qt. withdrawn through the sampling cock and the engine then stopped. After adjusting the oil level to 3½ qt., 1 pt. of fresh oil shall be added as required in Paragraph (*g*) and the test continued.

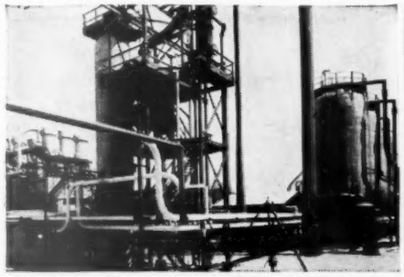
(*i*) The 36-hr. sample shall be withdrawn

For lasting efficiency and maximum fuel savings

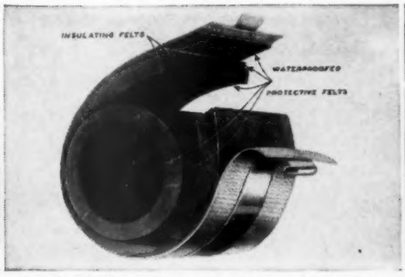
Johns-Manville Insulations



For All-Round Service at temperatures between 600° and 1900° F., J-M Superex Combination Insulation. Inner layer of J-M Superex, outer layer of J-M 85% Magnesia or Asbesto-Sponge Felted provide high heat resistance and efficiency. Blocks and pipe-covering.



For Steam Lines up to 700° F.—J-M Asbesto-Sponge Felted Pipe Insulation provides high salvage value, unusual durability. 3-ft. sections. Thicknesses from 1" to 3". Integral waterproof jacket for outdoor use.

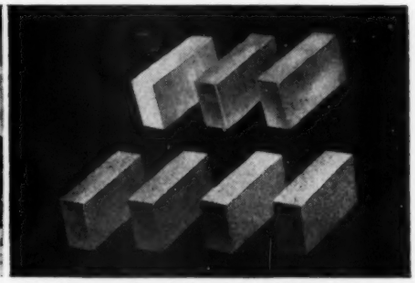


For Cold Water Lines—J-M Anti-Sweat Pipe Insulation. Designed to prevent condensation. In 3-ft. sections; thicknesses, ½" and ¾", solid construction; 1", 1½" and 2", broken joint construction.

For Boiler Drums, Water Walls, Tanks, Breechings—J-M 85% Magnesia Blocks, highly efficient at temperatures up to 600° F. Sizes 3" x 18", 6" x 36", 12" x 36", flat or curved. Thicknesses 1" to 4".

For Refrigerated Service—J-M Rock Cork. Basically mineral. Can't rot, won't support vermin or mold. In sheets, 18" x 36", 1" to 4" thicknesses. Pipe covering in 3-ft. sections with integral waterproof jacket.

For Furnace Insulation up to 1900° F.—J-M Superex Blocks, for years the most widely used block insulation at these temperatures. Sizes, 3" x 18", 6" x 36", 12" x 36". Thicknesses, 1" to 4", flat or curved.



For Furnace Insulation up to 2600° F. 3 types of J-M Insulating Brick, 4 types of J-M Insulating Fire Brick, are available. Furnished in all standard 9" shapes of the 2½" and 3" series, as well as in specials.

For details on these materials, and on the complete J-M Insulation line, write for catalog GI-6A. Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville INDUSTRIAL INSULATIONS

For every temperature . . . for every service

at the conclusion of the test, in the same manner as the 8-hr., 16-hr., and 24-hr. samples.

(*j*) The following data shall be recorded at hourly intervals during the 36-hr. test period:

(1) Engine speed in revolutions per minute,

(2) Beam load in pounds (report as horsepower),

(3) Crankcase-oil sump temperature in degrees Fahrenheit.

(4) Oil pressure in pounds per square inch,

(5) Coolant temperatures, at outlet and at inlet, in degrees Fahrenheit,

(6) Exhaust back pressure in inches of mercury, and

(7) Intake manifold depression in inches of mercury.

Air-Fuel Ratio

13. (*a*) The air-fuel ratio shall be determined at the start and again at the end of the 36-hr. test period in accordance with the procedure described in Appendix IV.

(*b*) The specific fuel consumption or the time required for the consumption of 300 ml. of fuel shall be recorded at the time samples of exhaust gas are withdrawn for the determination of the air-fuel ratio.

Inspection of Engine Parts

14. (*a*) At the conclusion of the test, the engine shall be torn down and inspected. The following parts shall be rated with respect to varnish and sludge deposits:

Varnish deposits:

Piston skirts,
Cylinder walls,
Rocker-arm cover,
Push-rod cover plate, and
Crankcase oil pan.

Sludge deposits:

Rocker-arm assembly,
Rocker-arm cover,
Push-rod cover plate,
Oil screen, and
Crankcase oil pan.

(*b*) The engine parts enumerated in Paragraph (*a*) shall be rated on a scale from 10 to 0. A rating of 10 shall be assigned to parts free of deposits. A rating of 0 shall be assigned to parts on which the deposits have reached a maximum or have actually caused engine failure.

(*c*) Photographs (Note 1) shall be made of the following engine parts:

Two pistons (Note 2),
Rocker-arm assembly,
Rocker-arm cover,
Push-rod cover plate, and
Oil screen.

NOTE 1.—Kodachrome positives of typical pistons may be employed for recording character and extent of piston deposits. Photomicrographs may be employed for recording extent of copper-lead bearing corrosion.[8]

NOTE 2.—If it is necessary to use phosphate-coated pistons, photographs will not show the extent of varnish formation on the piston skirts. In this case it will be necessary to wash the piston thoroughly with gasoline in order to remove excess oil, and to remove varnish from piston skirts by dissolving it in acetone. The varnish deposit should be reported in milligrams of the acetone-soluble material per piston.

(*d*) The copper-lead bearing halves shall be weighed to the nearest 0.01 g. to determine loss due to action of corrosive oxidation products. If visual inspection of the bearing halves shows evidence of mechanical failure, the loss in weight shall not be included in the report of bearing loss.

[8] H. L. Grange, "Metallographic Preparation of Copper-Lead Bearings," *Metal Progress*, Vol. 30, No. 5, November, 1940, p. 674.

Inspection of Oil Samples

15. (*a*) The following samples shall be examined to determine the rate of oxidation during the 36-hr. test period:

New oil,
16-hr. sample (Section 12 (*h*)), and
36-hr. sample (Section 12 (*i*)).

(*b*) If the test is stopped prior to the completion of the 36-hr. test period, the 8-hr. sample (Section 12 (*h*)) shall be examined.

(*c*) The samples prescribed in Paragraphs (*a*) and (*b*) shall be examined by the following methods of test:

Test	A.S.T.M. Designation [a]
Neutralization number	D 663
Naphtha-insoluble matter (method A or method B)	*b*
Chloroform-soluble matter (method A) or asphaltenes (method B)	*b*
Conradson carbon residue	D 189
Ramsbottom carbon residue (additional optional test)	D 524
Ash	D 482
Viscosity, Saybolt Universal, at 100 F.	D 88

[a] These designations refer to the following methods of the American Society for Testing Materials:
Tentative Method of Test for Neutralization Number of Petroleum Products by Color-Indicator Titration (A.S.T.M. Designation: D 663),[9]
Standard Method of Test for Carbon Residue of Petroleum Products (Conradson Carbon Residue) (A.S.T.M. Designation: D 189),[10]
Standard Method of Test for Carbon Residue of Petroleum Products (Ramsbottom Carbon Residue) (A.S.T.M. Designation: D 524),[10]
Tentative Method of Test for Ash Content of Petroleum Oils (A.S.T.M. Designation: D 482), and[11]
Standard Method of Test for Viscosity by Means of the Saybolt Viscosimeter (A.S.T.M. Designation: D 88),[12]

[b] See Appendix V.

Report

16. (*a*) The report shall include the following:

(1) Brand name or experimental designation of crankcase lubricant tested,

(2) Log sheet incorporating data required in Section 12 (*j*),

(3) Oil consumption in quarts per hour,

(4) Air-fuel ratio, including determinations of carbon dioxide, oxygen, and carbon monoxide,

(5) Specific fuel consumption or time required for consumption of 300 ml. of fuel,

(6) Evaluation of engine parts enumerated in Section 14 (*a*),

(7) Photographs of engine parts enumerated in Section 14 (*c*),

(8) Copper-lead bearing weight loss reported as loss for each individual bearing half,

(9) Results of examination of the oil samples designated in Section 15 (*a*) and (*b*) by the methods of test specified in Section 15 (*c*).

(*b*) A suggested log sheet and report form are shown in Appendices VI and VII.

Petroleum Pitch Used To Fight Magnesium Fires

(*Continued from page R-307*)

should be taken to keep water from reaching the bomb.

"To deal with a burning bomb on a wood floor, the procedure should be as follows: Spread a layer of pitch on the floor near the bomb, roll the bomb onto this layer, and cover with more pitch. Then scrape away and extinguish any burning embers on the wood floor. With this method the bomb is extinguished, and it is not necessary to remove it until convenient. Ten to 15 lbs. of pitch is required to extinguish the type of incendiary bomb most used by the Germans. This bomb weighs 2.2 lbs.

"Occasionally small incendiary bombs contain mild explosive charges that go off as the bomb burns. To guard against injury from such fragments, as well as against small fragments that are thrown off by an ordinary incendiary bomb during the initial ignition, it is best not to approach the bomb too closely but to use long-handled shovels or scoops. The use of fire-protective clothing and dark goggles is likewise advised."

As a result of the test work of the Bureau of Mines in extinguishing magnesium fires, the means for combating such fires can be divided into these three classes:

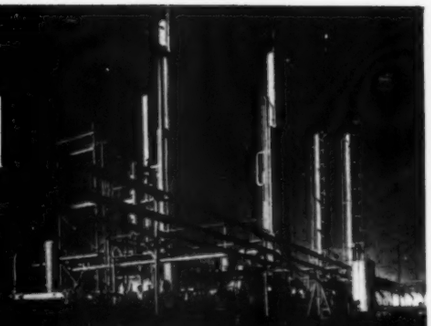
1—Hastening the combustion with water. When a coarse spray of water is applied, the magnesium usually burns out in one-fourth to one-half the time otherwise taken. Use of water is ordinarily recommended for combating bombs in private residences because the bomb frequently lands in inflammable material and wetting down the surroundings helps prevent the spread of the fire.

2—Partial sealing. This is a control method preliminary to scooping up the burning magnesium and removing it from the building. Materials used should be thoroughly dry and should not contain combined water that can react with the magnesium. Materials forming an effective covering for partial sealing are listed as follows: sand, salt, graphite, clean cast-iron borings, portland cement, powdered limestone, calcium carbonate, fluorspar, powdered borosilicate glass, talc, powdered slate and shale, brass turnings, shredded asbestos, ashes, slag, dry sifted earth, crushed bituminous coal, crushed anthracite, crushed petroleum coke, calcined fuller's earth, gas black, carbon black, ammonium phosphate and feldspar. Heavy lubricating oils should not be used as sealing mediums, the report emphasized. While effective on small fires, they add fuel to the flames on large fires.

3—Complete sealing with materials that soften and flow. The report discusses only hard petroleum asphalt or pitch from coal tar or water gas tar.

The report stated that the application to magnesium fires of water, carbon tetrachloride, carbon dioxide, foam and other common extinguishing agents usually increases the rate of burning; and, in some cases, use of these agents may result in violent explosions or in the emission of toxic or hazardous gases.

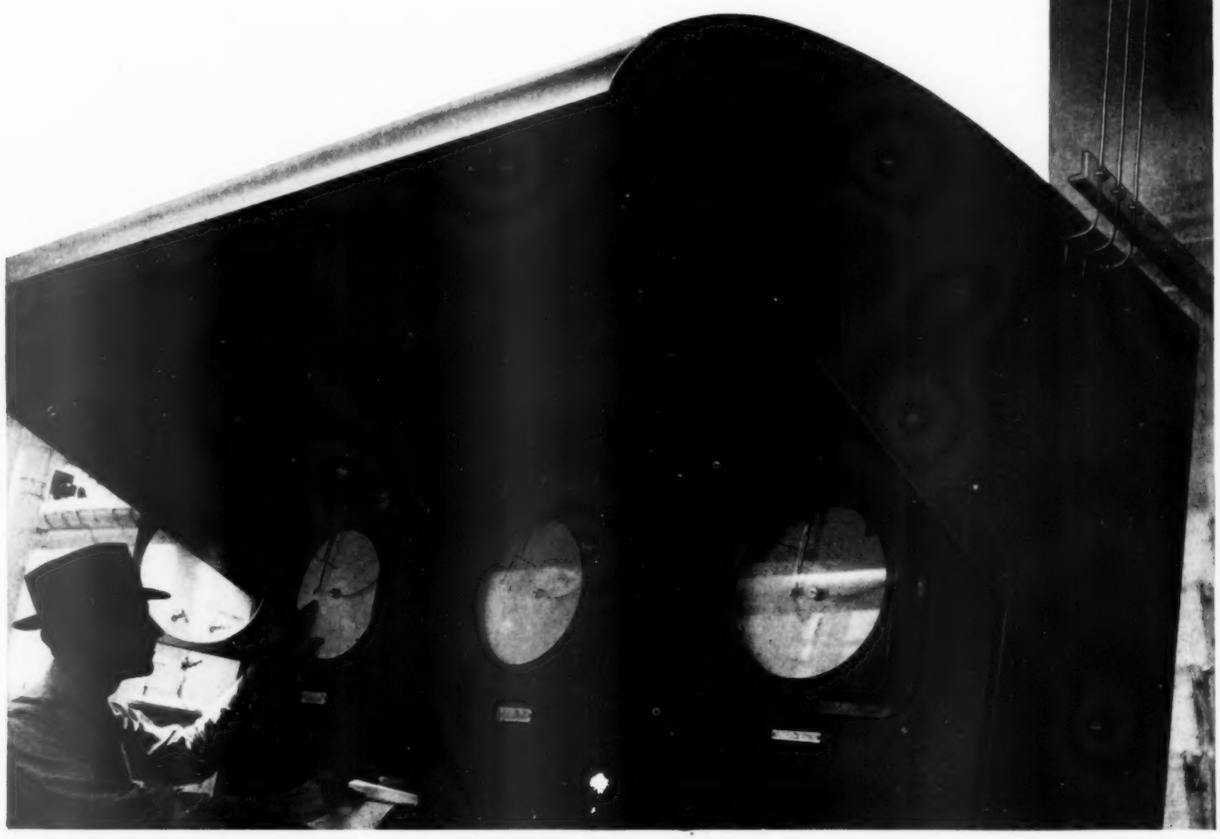
Centralized process control *tightens* control



● But make certain your centralized control system is **SIMPLE** and convenient as well as dependably accurate. If too complicated, the problem of "control of the control" arises—thereby defeating efficiency! Many engineers now are interested in the **METRIC-AMERICAN** Air-Actuated Remote Recorder and Controller . . . which strikes a modern new high in simplicity. Devised originally to provide sure, complete, centralized control where operating conditions were the most difficult and hazardous. Rugged yet sensitive . . . for the recording and control of pressures, liquid levels, rates of flow over any distance. Special bulletin **E-22** obtainable on request.

METRIC METAL WORKS • ERIE, PA

AMERICAN
METER COMPANY
INCORPORATED (ESTABLISHED 1836)



The Chemical Aspects Of Synthetic Rubber

● The refiner's field of interest has broadened to take in the technology of synthetic rubber, since petroleum is the starting material for a number of varieties. The accompanying article, by a chemical engineer, describes the chemical structures of these different varieties of synthetic rubber, some of which are similar in structure to natural rubber—as the butadiene copolymers—while others are very different.

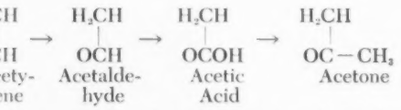
The discussion includes the Butyl type rubbers, which have recently been prominent in the news, as a possible source of a substitute for natural rubber in tires in the near future.

The article also discusses the physical properties and some of the industrial applications of the synthetic rubbers—*Ed.*

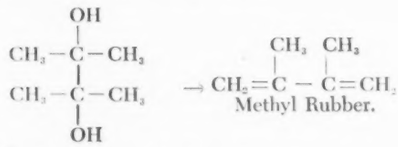
By Harold F. Crow

THE cost of natural rubber produced by cheap plantation labor in the Far East was so low in peacetime that there was little encouragement for the large-scale development of rubber substitutes in the U. S. Due to wartime shortages, as long ago as World War 1, in Germany, rubber substitutes were being produced.

The most successful was methyl rubber made from acetylene. The reaction may be represented:



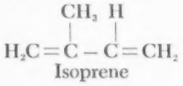
Two molecules of acetone combined together and then formed methyl rubber:



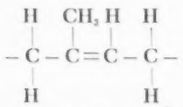
In this compound there is a greater proportion of methyl groups than in natural rubber. It was much more costly than natural rubber and was inferior in use. Once the emergency was passed, production ceased.

Natural rubber is a polymeric hydrocarbon with long chain molecules in which isoprene residues are linked together. The particular type of linkage accounts for the mechanical and chemical properties characteristic of rubber.

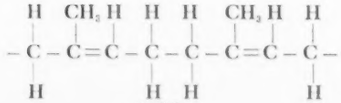
Natural rubber is obtained from latex by coagulation with acid. It is over 80 years since isoprene or 2 methyl 1:3 butadiene was isolated. This compound polymerizes in nature and isoprene monomers become hooked together in long chains to form rubber:



Isoprene



Isoprene monomer with free linkages.



Rubber.

In rubber there is a double bond after every fourth carbon atom. During the vulcanization process, sulfur links up with some of these double bonds.

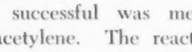
At first, work was carried out with the idea in mind of producing rubber synthetically, but the exact configuration of rubber is not known nor is the mechanism of polymerization by which isoprene becomes natural rubber completely understood.

It was only when attempts were made to produce rubber-like compounds that any success was attained. The first successful product was polychloroprene, which has many of the physical properties of rubber but which contains 40% of chlorine, an element not present in the natural product.

The various synthetic rubbers now on the market are the products of polymerization or condensation, and in this they are related to the plastics such as Bakelite. They consist of atomic chains of great length. There are two general reactions. In the first stage, the monomer is produced. The second stage consists of polymerization or condensation reactions usually requiring a catalyst and high temperature and pressure.

Polymerization Explained

For polymerization to occur, the monomer must be unsaturated, as saturated compounds do not polymerize. The rapidity of polymerization increases with the degree of unsaturation:



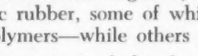
Butene
Slow Polymerization.

1:3 Butadiene.
Rapid polymerization.

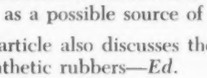
1:3 Butadiene
Very rapid polymerization.

Compounds in which a double bond alternates with a single bond will polymerize much more rapidly than those substances in which the double bonds are more widely separated. The unsaturated properties of the CO group in aliphatic acids are not sufficient to cause appreciable polymerization.

Carboylic acids may form loose dimers but polymerization only occurs if an olefinic unsaturated group is introduced as in oleic, linoleic and linolenic acids. If such olefinic group is conjugated with the CO group as in acrylic esters ($CH_2=CHCOOR$), polymerization is rapid. The rate is further increased by the combination of other groups with the middle carbon atom. The rate increases with substitution as in the following compounds:



1:3 Butadiene

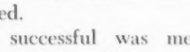


2 Methyl 1:3 Butadiene

2:3 Dimethyl
1:3 Butadiene.

Effect of Catalysts

It has been found that certain catalysts increase the rate also, although it is not clear in what way these substances react. With butadiene and isoprene, sodium may form a metal alkyl group:



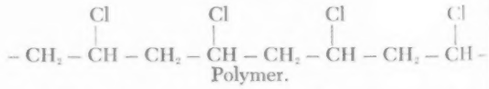
This would react with another butadiene molecule forming:

By continuing and by the addition of the olefinic link at both ends, long linear molecules are obtained which may consist of 500 or 1000 monomeric units. The number of monomers and the structure may be determined by measuring the osmotic pressure, the viscosity of highly diluted solutions, the sedimentation velocity in the ultra-centrifuge or the use of X-rays.

Molecular Relationships

Certain general relationships have been found between the molecular structure of long chain compounds and their properties. In many compounds, the orientation is linear. In vinyl chloride, one dimension increases greatly compared with the other two:

Vinyl Chloride



The elasticity strength and various other properties depend on the linear structure of the molecule. When the chains are oriented parallel, the compound shows maximum tensile strength. If the substance includes reactive groups, the linear chains may be united by cross linkages and form compact three-dimensional structures of quite different properties.

There are three classes of synthetic polymers:

1. Resinoids or plastics such as Bakelite.

2. Fibroids of which Rayon and Nylon are examples.

3. Rubberoids or compounds with properties resembling rubber.

One of the earliest rubberoids to be mar-

How to make rubber

There is no mystery about synthetic rubber or the way to make it

Butadiene and styrene are its chief components They are derived from petroleum and there is plenty of petroleum

Universal catalytic processes are ready to produce butadiene and styrene from petroleum in any quantity needed

Those processes and the catalysts that make them work effectively are at the service of all refiners under license from Universal

OIL IS AMMUNITION—USE IT WISELY

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

keted was Chloroprene or Neoprene, manufactured by the du Pont company. The production may be represented:

$$3C + CaO \rightarrow CaC_2 + CO$$
Coal Lime Calcium Carbide

$$CaC_2 + H_2O \rightarrow HC{\equiv}CH + CaO$$
Acetylene Lime

$$HC{\equiv}CH + HC{\equiv}CH \rightarrow HC{\equiv}C-CH-CH_2$$
Monovinyl acetylene

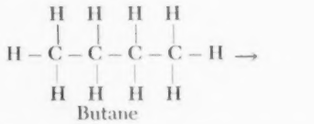
$$HC{\equiv}C-CH-CH_2 + HCl \rightarrow CH_2{=}CCl-CH{=}CH_2$$
2 chloro-butadiene (chloroprene)

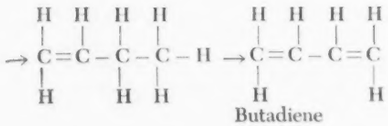
Chloroprene may be polymerized and numerous Neoprenes are obtained with varying properties. These can be processed on rubber machines. They can be vulcanized and resemble natural soft rubber. For many purposes they are superior to rubber.

The Neoprenes are more resistant to heat, sunlight and oxidation and are more impermeable to gases. Usually they are less resistant to cold water but may be compounded to give high resistance to hot water. In many cases Neoprenes are to be preferred for hose, gaskets, packings, conveyor belts, and linings for tanks to resist oil or high temperatures. One big advantage over some other rubber substitutes is that Neoprenes can be obtained white whereas some synthetics are always dark colored.

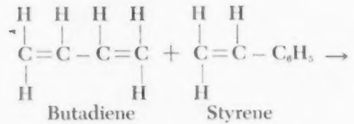
Buna Rubber Discussed

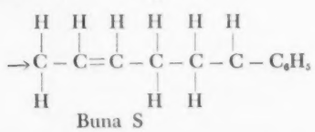
The Buna rubbers have recently become important. These include Perbunan, Buna S, Hycar and Chemigum. Buna S is extensively used by the German army but Perbunan is far more resistant to oil and solvents and is more widely used in the U. S. These are all prepared from butadiene by the removal of hydrogen as follows:


Butane


Butadiene

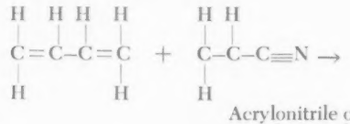
By polymerizing butadiene with styrene, Buna S is obtained:

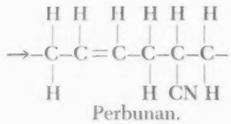

Butadiene Styrene


Buna S

Styrene is vinyl benzene and occurs in the xylene fraction of coal-tar distillates. Also ethylene acts on benzene forming ethylbenzene which in turn forms styrene. Above 100° C. this polymerizes rapidly.

In the presence of acrylonitrile, butadiene polymerizes to Perbunan:


Acrylonitrile or Vinyl cyanide


Perbunan.

The Germans prefer to polymerize butadiene over metallic sodium in the production of Buna rubbers. Various other compounds such as diolefines and vinyl derivatives may be added as copolymers. In Germany, butadiene is prepared by the limestone-coke-acetylene process but in the U. S., the source is chiefly petroleum.

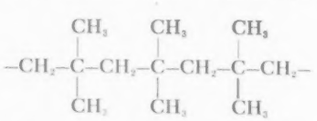
Buna N, Hycar OR and Chemigum are very similar to Perbunan.

To improve the tensile strength of the Buna rubbers, carbon black is usually incorporated. Any Perbunan which is light colored may be expected to be weak. In normal times, the Bunas are more expensive than natural rubber and are more difficult to process.

Perbunan is useful as tank linings to resist acids, alkalies and water but the electrical properties are not outstanding, although good enough for some purposes. In Germany, Buna is reinforced with wire when used for gaskets and is then superior to asbestos. Buna S resists abrasion and many chemicals and has good electrical properties, but is not oil resistant. Hard Buna S will replace hard rubber for many purposes.

Structure of Butyl Rubber

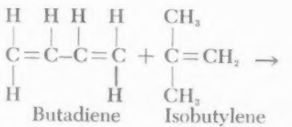
A rubber substitute which has been much in the news recently is Butyl rubber. In many ways this is different from the older synthetic rubbers. The structure can best be understood by considering the butene polymers:

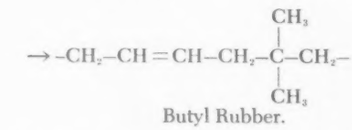


Although derived from the olefines, this does not resemble the compounds previously mentioned. This is a saturated hydrocarbon structure. As there are no unsaturated groups, it should be difficult to vulcanize. It is therefore necessary to mix a small amount of diolefines as copolymers with the butenes. In this way, a limited number of olefinic links are introduced and these will react with sulfur.

Nowadays, the special properties of rubber, such as elasticity and tensile strength, are not considered to depend on the compound having a large number of double bonds. Such unsaturated linkages may actually give rise to undesirable properties and reduce the resistance to aging and oxidation. Because of the lack of unsaturated groups, compounds of the Butyl rubber type may eventually prove to be far superior to natural rubber.

The formation of Butyl rubber may be represented as follows:

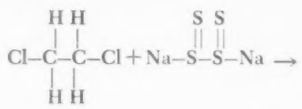

Butadiene Isobutylene

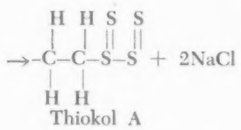

Butyl Rubber.

The butadiene groups may be greatly outnumbered by the isobutylene groups in the chains.

Preparation of Thiokol

There are also several polysulphide rubbers known as Thiokols. Thiokol A is prepared by the condensation of ethylene dichloride and sodium tetrasulphide:



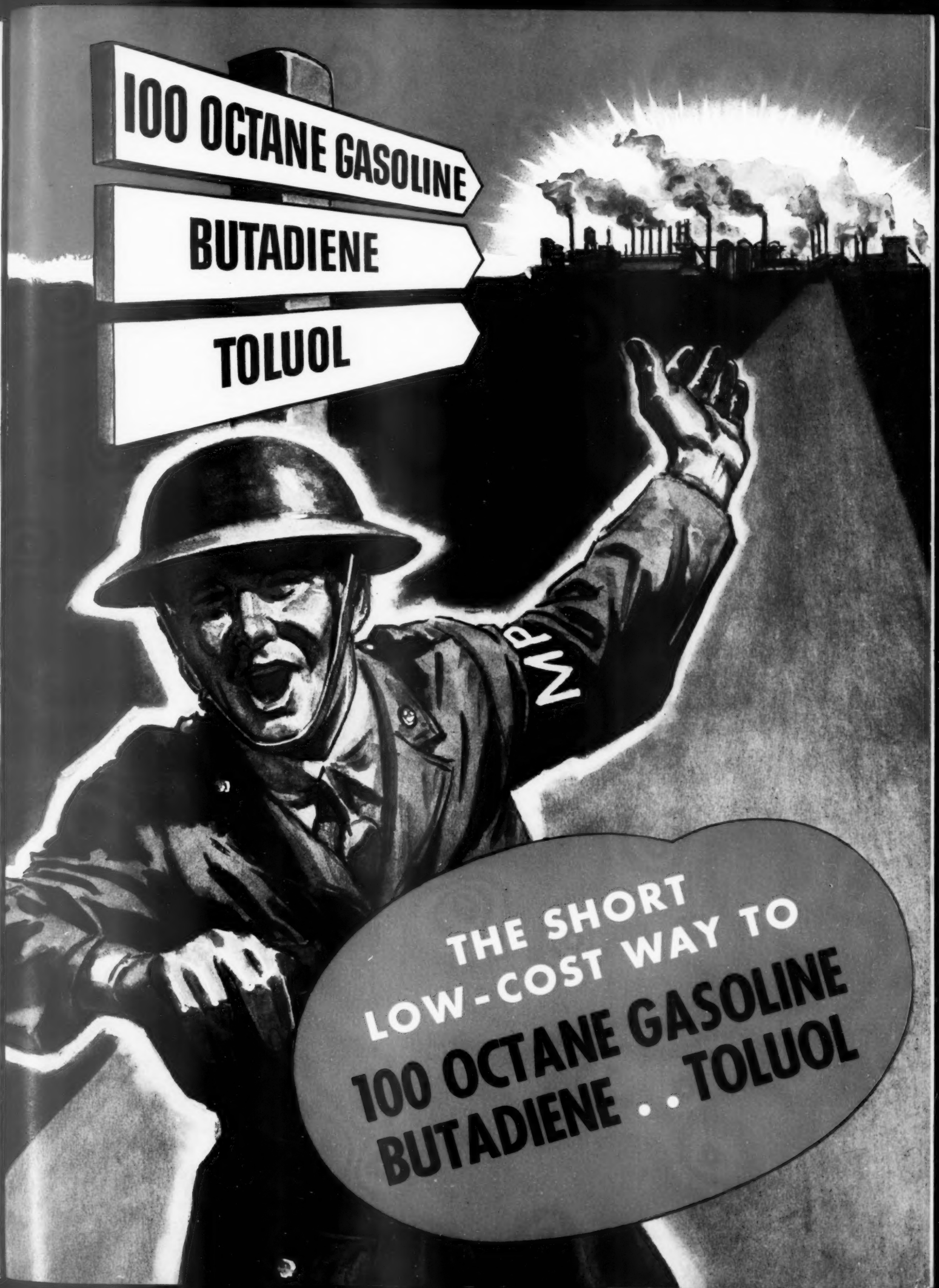

Thiokol A

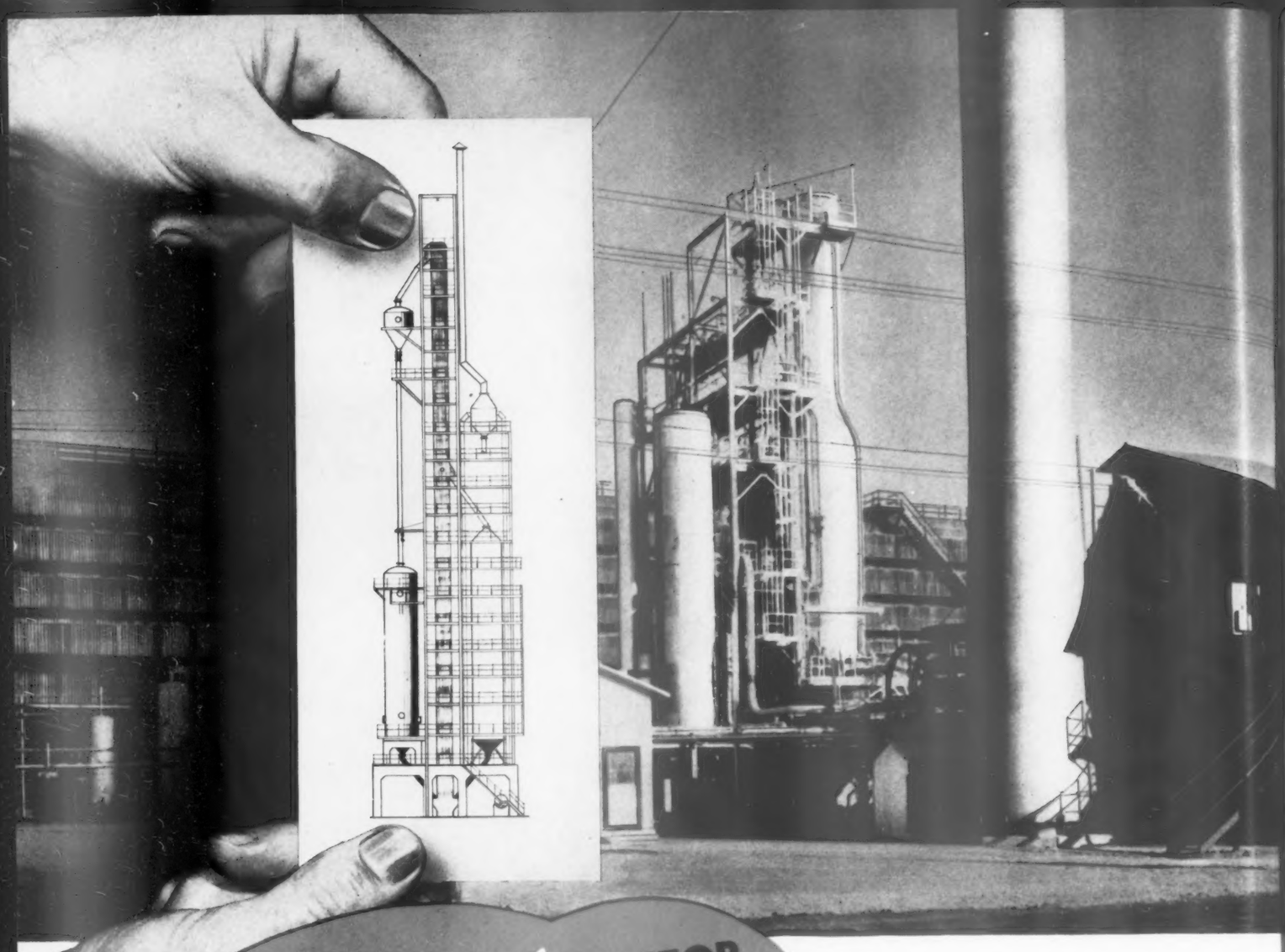
These compounds have quite exceptional resistance to oils and particularly to chlorinated solvents and aromatic hydrocarbons at normal temperatures. At high temperatures they become plastic. They are useful for self-sealing gasoline tanks.

In general, the synthetic rubbers are more resistant to oil, solvents and gasoline than natural rubber. Some compounds are more resistant to heat, sunlight, aging and oxidation. Neoprenes are flameproof, and one Neoprene resists freezing temperatures much better than rubber and even as low as —60°F. is quite flexible. This may be important in climates such as northern Canada and Russia. Balloon fabrics coated with Neoprene or Thiokol are less permeable to gases and resist sunlight well.

By far the greatest proportion of rubber is needed for tires and for this purpose Neoprenes and butadiene polymers are preferable in the absence of adequate supplies of natural rubber. The polysulphide rubbers and the polyisobutylene compounds have specialized fields of usefulness but are not the equal of the Neoprenes and the butadiene compounds for general use.

The Buna S type has probably the most general application for war purposes. Fortunately, the raw materials are plentiful. Butadiene is obtainable from petroleum, natural gas, alcohol, acetylene. Styrene can be made from the benzol produced in coke-oven operations. However, butane which is needed for making butadiene, is also necessary for high-octane gasoline.


100 OCTANE GASOLINE
BUTADIENE
TOLUOL
MP
THE SHORT
LOW-COST WAY TO
100 OCTANE GASOLINE
BUTADIENE . . TOLUOL



The addition of **REACTOR, THERMOFOR KILN, CATALYST ELEVATORS AND FACILITIES—**

Will convert any **existing Thermal Cracking or Topping Unit to a Thermofor Catalytic Cracking Plant***

A number of Lummus-built T.C.C. units*, including five T.C.C. elements for conversion of existing equipment, are now under construction for major oil companies.

*Licensed by the Houdry Process Corporation

THE LUMMUS COMPANY, 420 Lexington Ave., N. Y.

600 So. Michigan Avenue, Chicago, Ill.
2315 Tangley Road, Houston, Tex. Florida, 671, Buenos Aires, Argentina
70 Barn Hill, Wembley Park, Middlesex, England

LUMMUS

PETROLEUM REFINING PLANTS

Importance of Proper Desalting of Crude Shown in Photomicroscopic Study

THE physical state and behavior of salts found in crude oils, either when present in an emulsified brine or as fine crystals, play an important part in the desalting operations which many refining plants use to remove materials which would otherwise cause accumulation of deposits and corrosion in the processing equipment.

In a photomicroscopic study of salts in some Mid-Continent crudes, made by the U. S. Bureau of Mines Experiment Station at Bartlesville, Okla.,* it was found that "salt" in the brine solution ultimately will precipitate as free or oil-coated microscopic crystals when the emulsion film has broken, or when other conditions exist that permit the water to evaporate from the brine. From these observations it was concluded that it is better to make one complete dehydration of the emulsified oil at the time of treatment, rather than to permit the opportunity for salt crystals to form in the partly demulsified brine.

It was also found, in experiments under the microscope, that the proper chemical destabilizer (emulsion breaker) will give excellent results; but the use of an unsuitable chemical often creates a very fine "tight" emulsion, which might not be detected by the usual tests and would result in inclusion of much salt in a supposedly desalted oil.

Probed Emulsions

The emulsions investigated were limited to water-in-oil (brine-in-oil) type. Treatment of such emulsions constitutes a major problem for many oil companies, the authors stated. To the naked eye, such emulsions appear to be unchanging masses of small drops clinging together as a mobile liquid; but, when viewed with the microscope and depending on the magnification and emulsion type, these droplets can be studied individually. In the procedure of this study, the data was obtained by the use of a petrographic microscope in conjunction with a camera to record observations. Chemical analyses also were made to determine the quantities of the predominating salts and the total quantities of water-soluble chlorides in the crude oils.

In a natural or untreated emulsion, the film of oil surrounding emulsified brine globules has been found to remain intact for some time, preventing the evaporation of water and crystallization of the salt. But most of the salt will ultimately be precipitated as crystals if the emulsion be exposed to the air sufficiently long. Differences in emulsions are attributed to several causes, such as the character of the oils and the emulsifying agent, or the mechanics of the dispersion process—agitation of the oil and brine during production—since, quite frequently, the stability of the emulsion formed depends on the particle size.

Commercial chemical demulsifiers used to "break" emulsions are frequently variable and indefinite in composition so their effective action is not generally predictable, the authors prove. Observation of a number of treated crudes disclosed physical effects on interfacial tension, coalescence of freed brine droplets, and evaporation of water from these exposed surfaces. For example, it was found the effectiveness of destabilizers often depends on time of contact and the salt content of the treated oil depends on time required for water to evaporate from the freed brine droplets.

2 Wells Analyzed

In one observation, samples of oils from two offset wells producing from the same formation and at comparable rates of fluid production were examined. Destabilization chemical was added "down the hole" in one well; the other was untreated. The untreated oil contained 10% emulsion, but the treated well, formerly producing a highly-emulsified oil, produced only 1% emulsion after treatment was started. Water-soluble salts in the two oils had the following composition (determined by the Bureau of Mines method and reported after the system of Hale):

Salt	Untreated Oil lb/1000 bbl.	Treated Oil lb/1000 bbl.
$CaCO_3$	32	....
$CaSO_4$	3	5
$CaCl_2$	604	23
$MgCl_2$	362	6
NaCl	4320	55
Acid	....	Trace

Smear samples of each oil were placed on a slide, examined and photographed at stated intervals to record the changes which occurred. In the untreated sample, only one droplet in the area under observation was found to have ruptured its oil film and formed a crystal after 20 hours exposure to air.

In the treated sample, several crystals from

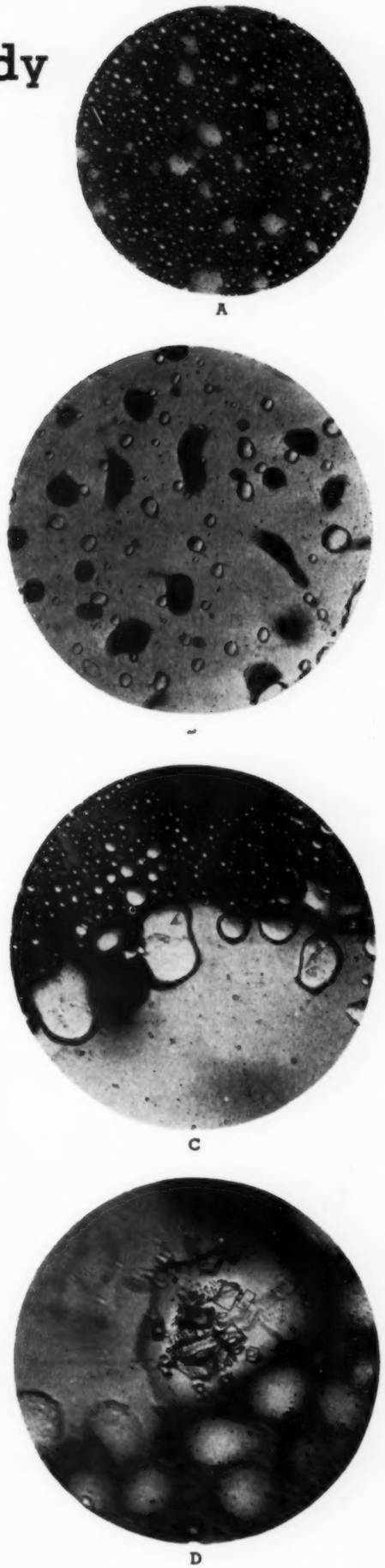
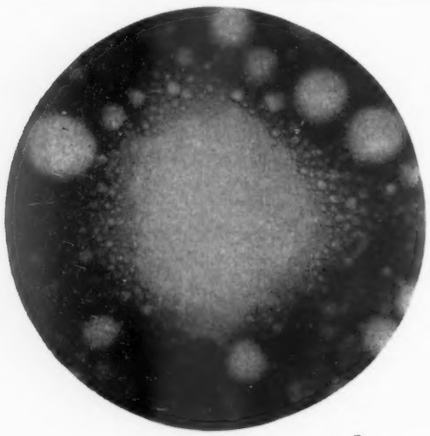


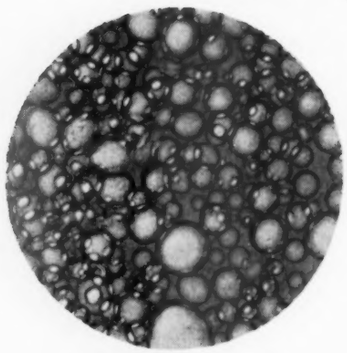
Fig. 1—Effect of proper destabilizing agent on an emulsion. (A) Untreated emulsion in fresh oil. Kansas City limestone (25 X, plane polarized light). Each globule of brine is surrounded by oil film, preventing coalescence. (B) Same emulsion, same magnification, 0.5 minute after treatment with demulsifier. (C) Shows boundary between treated and untreated emulsion: light portion is treated emulsion. (D) Salt crystals forming on boundary of treated and untreated emulsion (100 X, plane polarized light).

Courtesy U. S. Bureau of Mines

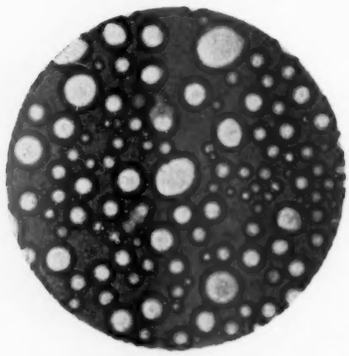
*Technical Paper 638, "Photomicroscopy of Salt in Petroleum", by Lloyd F. Christianson and J. W. Horne, assistant petroleum engineer and associate chemist respecively U. S. Bureau of Mines Experiment Station, Bartlesville, Okla.



A

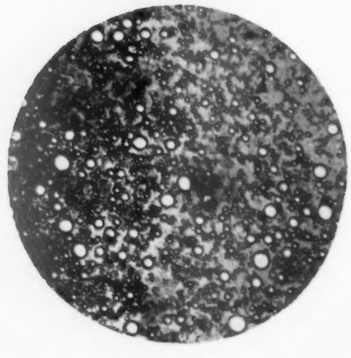


B



C

D



E

ruptured droplets were formed after only 35 minutes exposure to air. After 3.5 hours salt crystals had formed in most of the emulsion droplets and some of them were encased by oil films. After 20 hours, nearly every droplet had ruptured and crystals had formed. The emulsion was found on initial observation to be much finer and more evenly dispersed in the untreated than in the treated oil.

Best Time to Desalt

From these observations, the authors conclude that apparently more efficient desalting would be accomplished by removing the separated brine immediately after destabilization than by permitting evaporation in contact with the oil.

Observations also were made to determine the reaction occurring when a correct destabilizer is added to an emulsion. As soon as the agent was added, the protective film of oil around the droplets broke and the drops of water began to coalesce. Salt crystals were forming within 35 minutes. With the improper destabilizer in the same oil, a loose emulsion was converted by the treatment to a "tight" or finer emulsion of greater uniformity. Although an appreciable amount of brine settled out of the oil on 3 hours standing, no more water accumulated after further standing. Microscopic examination showed presence of emulsion globules, which did not coalesce and remained the same size. Agitation tended merely to make the globules more uniform in size. A centrifugal sample showed apparently clear oil on top, but microscopic examination disclosed a very fine emulsion remained in the oil. This proves that a destabilizer which is very effective for some oils produces a tight emulsion containing large quantities of salt when used in other oils. The authors state the A.S.T.M. Standard Method of Test for Water and Sediment°° often does not show the total quantity of emulsion of this type, even after the oil has been stored for some time.

The existence of salt crystals in oil is apparent whenever there has been opportunity for water to evaporate from the brine, and also may come from the producing formation. Examination of fresh oil from wells shows the presence of salt crystals apparently present when the oil came from the well.

Collects on Well Casing

A problem of growing importance to the industry reported to the authors is the deposition of salt in and around the casing of the well in sufficient quantity to curtail flow of oil. Wells in Kansas, Texas, Louisiana and West Virginia that produce very little water have "plugged" because of the gradual formation of solid masses of salt crystals on the open sand face around the tubing as well as over the perforations inside the tubing. On this problem the authors comment:

"Such deposition of salts may be caused by a change of the equilibria of saturation of the brine from its natural state of saturation in the formation to a supersaturated solution near or in the well. The change is caused by decreased pressure and reduced temperature, which is probably sharpest at the sand face and inside the well tubing at the perforations; consequently the salt deposits at these two points.

"The deposition is not due to retrograde condensation (although "salting up" is experienced in some condensate wells), but to simple evaporation of water from the brine in a very limited region at or in the well. Then as evaporation progresses fine crystalline salt is deposited.

"However, for solid salt to be formed, the quantity of excess water in the brine must be relatively very small. Further, it is a physical habit of crystals freshly formed from a solution to cohere and to adhere very tenaciously to adjacent surfaces. This fact might explain the salt filling the voids in the producing formation near the well and thus eventually stopping the flow of oil to the well. Piling up of the salt over the casing perforations, tubing chokes, submerged pumps, valves, or other constructions is explained by the same phenomenon. . . ."

Salt Plugging of Wells

"The authors have no information regarding the extent of the precipitation of salts in the producing formation. However, a rapid drop in output from certain wells that formerly produced for years at a slowly decreasing rate is not unusual in fields where salt plugging is now common. Such a condition indicates that salt may be depositing in the formation at a distance from the well, either by the increasing differential in pressure between the well sand face and the reservoir or by continual evaporation of water and consequent drop in temperature and supersaturation of the brine.

"One of the most interesting fields in the Mid-Continent area, where the precipitation of salt in wells is common, is the Rhodessa of northern Texas and Louisiana. The oil flows from a limestone formation, at a depth of about 6000 ft., and a large differential pressure exists between the bottom of the well and the surface connections. The oil contains a large quantity of gas that expands considerably in rising to the surface. Some of the wells in this field have become plugged as a result of the precipitation of salt crystals at the sand face and often in the tubing. The crude produced is paraffinic and contains a suspension of relatively large wax crystals. Each small crystal of salt precipitated in some of the wells is covered with wax, making solution of the salt in water very difficult at normal temperatures. The small crystals precipitated are well-formed. . .indicating that their formation occurred by evaporation of the brine rather than by erosion of underground salt

°°A.S.T.M. Designation D96-35: A.S.T.M. Standards 1939, Part III, pg. 233.

Effect of improper destabilizing agent on an emulsion. (A) Untreated emulsion in fresh oil, Kansas City limestone (100 X, plane polarized light). (B) Treated emulsion 24 hours after chemical was added (same magnification). (C) Negative coalescence after exposure to air. (D) Salt crystals forming in treated emulsified brine. (E) Oil apparently clear after standing in open tube 48 hours under microscope shows very fine stable emulsion remaining (100 X, oblique transmitted light)

deposits, under which condition it is likely that some large crystals or crystal fragments would be present in the freshly produced oil."

(The report presents studies of various types of salt crystals found in oils, some of which were covered with wax, asphalt and other hydrocarbon films, discussion of which has been omitted here.—Ed.)

Arkansas Crudes Studied

Studies were made of 3 different types of Arkansas crudes to determine the chemical and physical changes in the salt content caused by electrical desalting and by refining.

A composite Schuler crude resulting in a mixed paraffin-intermediate base oil showed, in pounds per 1000 bbls., 6 calcium sulfate, 54 calcium chloride, 6 magnesium chloride, 44 sodium chloride and 25 hydrochloric acid. Microscopic examination under polarized light showed "myriads of crystalline salt clusters". After electric desalting, analysis showed, in same terms, 3 lbs. calcium sulfate, 15 calcium chloride, 4 magnesium chloride and 27 sodium chloride. Desalting removed about 68% salt, leaving some water in the oil, and some salts of magnesium and calcium were observed under polarized light.

Residuum from topped Schuler crude indicated 5 lbs./1000 bbls. calcium sulfate, 8 of calcium chloride, 6 of magnesium chloride and 22 of sodium chloride, with only a trace of acid.

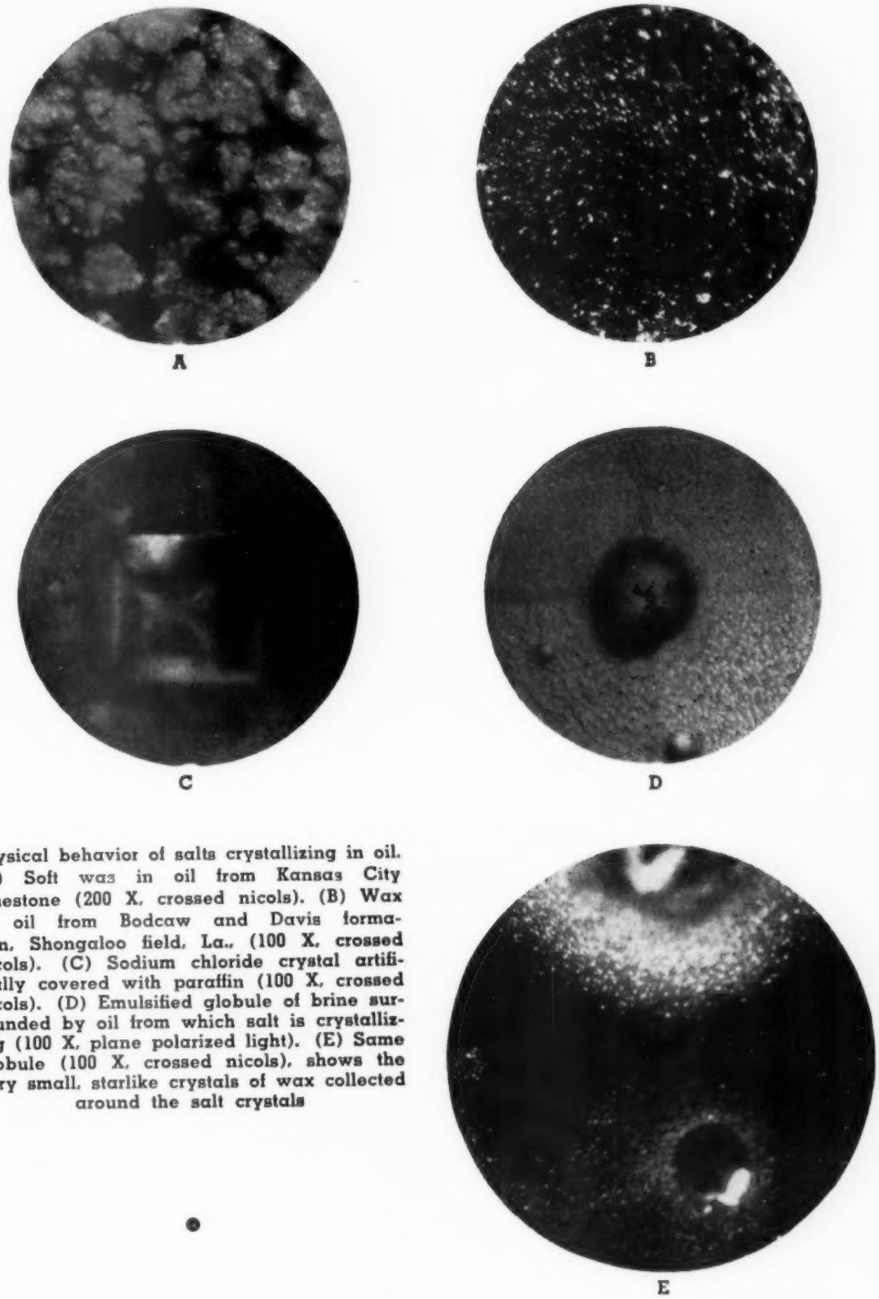
Tests of an intermediate-base oil, Urbana crude, show 16 lbs./1000 bbls. calcium carbonate, 1 of calcium sulfate, 86 of calcium chloride, 17 of magnesium chloride and 191 of sodium chloride. A free emulsion but no salt was observed microscopically before desalting. After desalting, analysis shows 21 lbs./1000 bbls. of calcium carbonate, 27 of calcium chloride, 4 of magnesium chloride and 46 of sodium chloride. Microscopically, a fine emulsion was noted, with crystals of calcium and magnesium chlorides and carbonates observed under polarized light.

After topping, residuum held 20 lbs./1000 bbls. of calcium carbonate, 1 of calcium sulfate, 23 of calcium chloride, 8 of magnesium chloride and 53 of sodium chloride. Small crystals in quantity greater than in the desalted untopped sample were noted under polarized light. In a heavy residuum from same oil, calcium chloride totaled 47 lbs./1000 bbls., calcium sulfate 1, calcium chloride 51, magnesium chloride 13 and sodium chloride 46; the microscope showed sodium chloride crystals. Calcium and magnesium salt clusters were seen under polarized light.

Smackover Crude Tested

Tests of a naphthene-intermediate base oil from the Smackover field showed, untreated, 52 lbs./1000 bbls. calcium chloride, 22 of magnesium chloride, 172 of sodium chloride and 25 of hydrochloric acid. Under the microscope, sodium chloride was observed with plane polarized light; magnesium and calcium salts under crossed nicols.

Same oil, desalted, contained 18 lbs./1000 bbls. calcium chloride and 42 of sodium chloride. Under the microscope, no crystals were observed when the slide was first exposed to air, but after 1 hour, minute crystals were noted under crossed nicols.



Physical behavior of salts crystallizing in oil. (A) Soft wax in oil from Kansas City limestone (200 X, crossed nicols). (B) Wax in oil from Bodcaw and Davis formation, Shongaloo field, La., (100 X, crossed nicols). (C) Sodium chloride crystal artificially covered with paraffin (100 X, crossed nicols). (D) Emulsified globule of brine surrounded by oil from which salt is crystallizing (100 X, plane polarized light). (E) Same globule (100 X, crossed nicols), shows the very small, starlike crystals of wax collected around the salt crystals

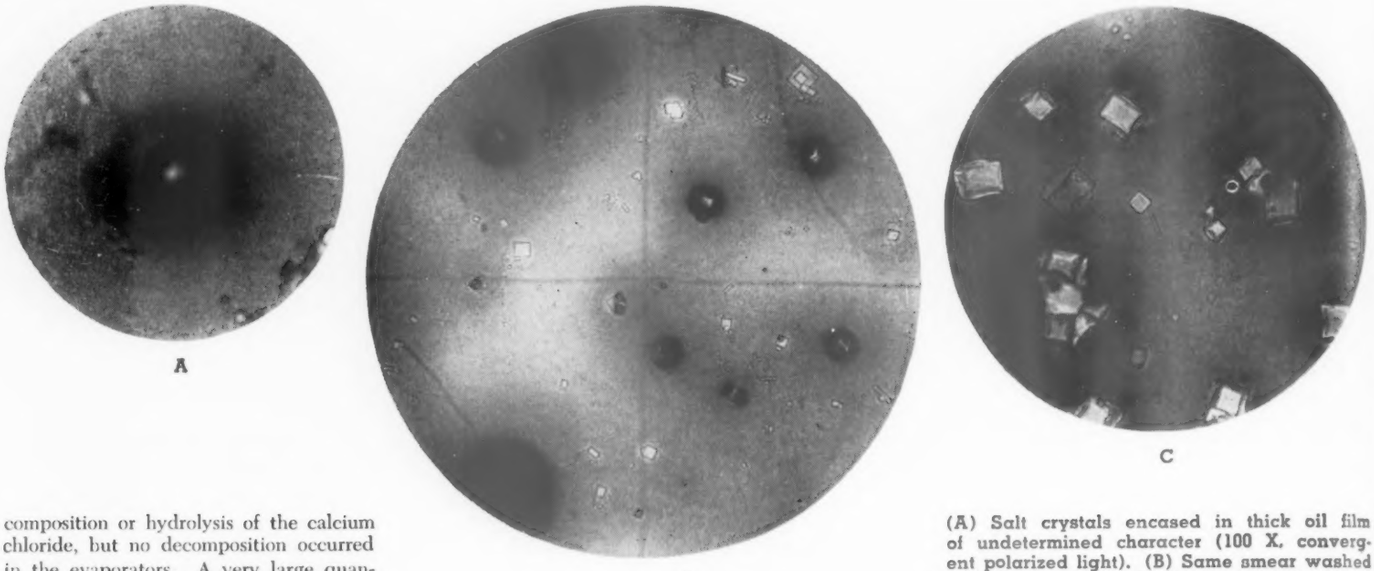
Evaporator Bottoms Examined

Examination of evaporator bottoms from this oil showed many fine crystals too small for identification under plane polarized light and with crossed nicols. Use of a solvent to decrease the viscosity of the residuum permitted identification as sodium, calcium and magnesium salts. Analysis showed 10 lbs./1000 bbls. calcium sulfate, 27 of calcium chloride, 8 of magnesium chloride and 47 of sodium chloride.

An asphalt from the same crude oil showed very few magnesium and calcium salt crystals with the majority sodium chloride—all very small and not fragmentary. Analysis showed 9 lbs./1000 bbls. calcium sulfate, 58 of calcium chloride, 7 of magnesium chloride and 124 of sodium chloride.

With the Schuler crude, the refiner reported hydrochloric acid in condensed water from the topping side of the still which he had to neutralize with ammonia. Before desalting the original charge and without ammonia, tests show 15 lbs. of iron per day being lost from the still. Some decomposition of magnesium salts also was noted. A considerable deposit of sodium chloride was found in the heat exchanger and still. The amount of coking also decreased after the charging stock was desalted.

With the Urbana crude, condenser water on the topping side was corrosive due to de-



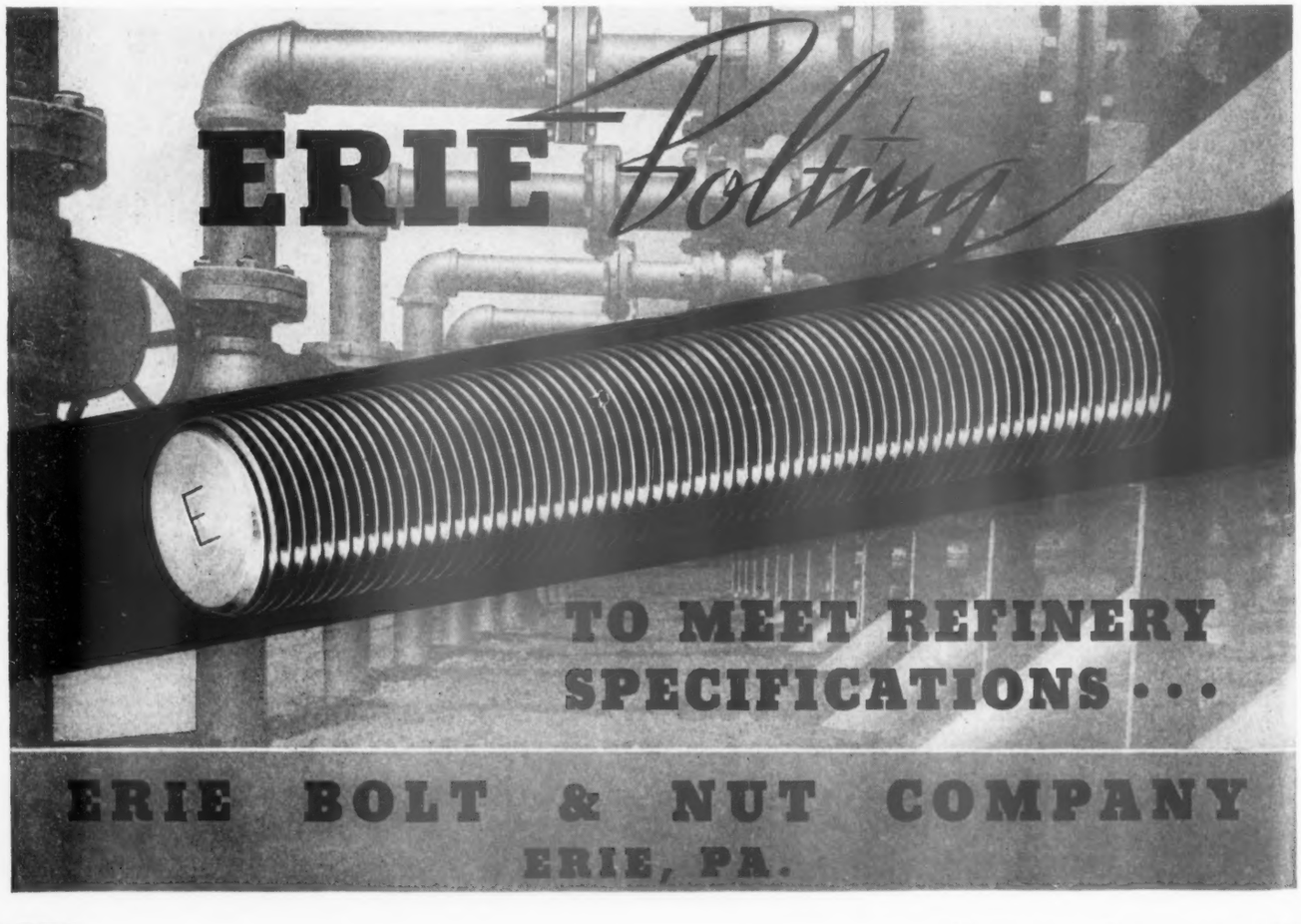
A B C

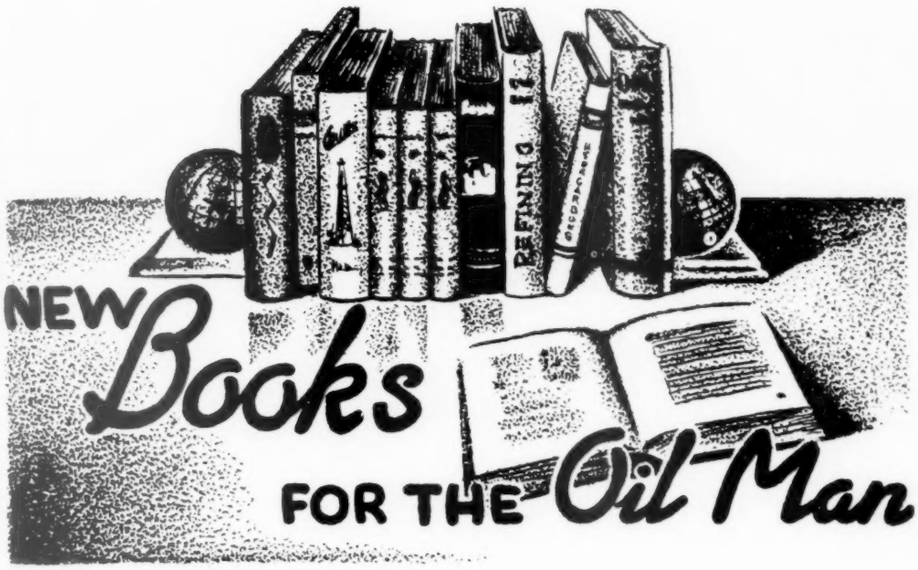
(A) Salt crystals encased in thick oil film of undetermined character (100 X, convergent polarized light). (B) Same smear washed with methylene dichloride to dissolve both wax and asphalt (same magnification). (C) Same smear washed 3 times more and exposed to air 10 hours shows some crystals washed free of their coating while others were not (100 X, plane polarized light)

composition or hydrolysis of the calcium chloride, but no decomposition occurred in the evaporators. A very large quantity of sodium chloride was deposited in the exchangers and tube stills before desalting, which was so decreased by desalting before charging that only 64 lbs. of sodium chloride per 1000 bbls. of oil charged was deposited in the unit "resulting in an increased 'on-stream' period from 5 days to 45".

With the Smackover crude, some chloride in the condensed water from the topping unit was found, although there was no deposit of calcium chloride. Corrosion was found to be due to hydrogen sulfide and corrected by treatment with caustic soda. Fifty percent of the magnesium chloride was decomposed after the first pass through the stills, according to the tests.

The authors conclude that interpretation of the optical and crystallographic properties used in the identification of the salts in the oils can be correlated with chemical analysis. In addition, the results of desalting operations and demulsifying agents can be readily determined.





New Work on Chemical Aspects of Petroleum

The chemical aspect of petroleum and its products are comprehensively treated in "The Chemical Technology of Petroleum" by William A. Gruse and Donald R. Stevens, of the Mellon Institute of Industrial Research, which is a complete revision of the book published in 1928 under the title of "Petroleum and Its Products", of which Gruse was the author.

When an attempt was made to prepare a second edition of this work—the chemical interpretation of the facts known about petroleum and its utilization—it was found much easier to start from the beginning, the authors state in the preface. This field has undergone almost revolutionary developments. A renascence in aliphatic chemistry had occurred, they stated, and a new technology of petroleum had arisen, outstripping the science which underlies it. Under these circumstances, a new approach was deemed best, and the effort to render the work as complete as practicable resulted in doubling the size of the original volume; a new title therefore seemed appropriate. The book contains 700 pages.

In view of the present trend toward the processing of gases to recover new materials from petroleum, the chapter on cracking of petroleum oils contains valuable data on the cracking of the gaseous hydrocarbons. The chapter on gasoline and other motor fuels includes studies of the knocking characteristics of individual hydrocarbons, lead susceptibility and characteristics of diesel fuels.

The chapter on physical properties was contributed by J. R. Bowman of Mellon Institute and covers mechanical, optical, thermal and electrical properties of crude oils and products, that on distillation is from the same source. The contribution of chemistry to the production of crude oil is covered in a chapter by H. T. Kennedy of Gulf Research and Development Co. The applications include drilling muds, acid treatment of wells, chemical water shutoff and reservoir equilibria. The chapter on the relatively new science of chemical thermodynamics of petroleum products is by C. W. Montgomery and J. H. McAteer of Gulf Research and Development Co.

"Chemical Technology of Petroleum" sells for $7.50 postpaid in the U. S. and can be bought through the book department of National Petroleum News, 1213 W. Third St., Cleveland.

* * *

Fourth Edition of Text On Industrial Chemistry

The great dependence of the nation in its war effort on the chemical manufacturing industries should stimulate interest in the new fourth edition of "Industrial Chemistry", by Emil Raymond Riegel, professor of industrial chemistry at the University of Buffalo, with the aid of a number of collaborators. The last stages of the preparation of the text, the publishers point out, fell within the war period and many chapters, including those on petroleum and its products, on synthetic and semi-synthetic organic chemicals, on synthetic plastics and resins and on rubber—natural and synthetic—reflect briefly the influence of the war program on the demand for these products.

The general scheme of the book is unchanged in the new edition of over 800 pages. The chapter on rubber includes the new developments in synthetic rubbers, as well as the latest advances in working natural rubber. The innovations in the technology of petroleum include statements on aviation gasoline, alkylation, the Houdry catalytic process and other topics. "The bottleneck in our TNT manufacture will not again be toluene, thanks in part to the process of 'hydroforming' petroleum fractions," states the preface.

In other fields, the changes in the new edition include entirely new chapters on paper and pulp and synthetic textile fibers, and the reworking of the chapter on Portland cement. The latest developments in the manufacture and application of dyes are given, and in the hydrolysis of fats and in the distillation of fatty acids. The manufacture of aluminum and magnesium metals is emphasized. The chapter on fuels has been reshaped, and data on costs of hydroelectric power and steam power are given. New flowsheets and photographs appear in several chapters.

The fourth edition of "Industrial Chemistry" can be bought through the book department of National Petroleum News, 1213 W. 3rd St., Cleveland, for $5.50, postpaid in the U. S.

* * *

New Edition of Handbook Of Butane-Propane Gases

Containing additional material and better arranged by sections and chapters, the third edition of the "Handbook of Butane-Propane Gases" remains the encyclopedia of the liquefied petroleum gas industry. A new feature of this edition is a chapter on the ABC of liquefied petroleum gases, which contains fundamental information and data which will be helpful to readers not familiar with this branch of the petroleum industry. Another new chapter is devoted to fire protection and control, and discusses fire protection methods and equipment, and methods for the safe storage and transportation of these liquid hydrocarbons, among other features.

A section on distribution arranges material under this heading in 5 chapters: The installing and servicing of l. p. g. systems, semi-bulk systems, bottled gas systems to serve domestic consumers, gas utility service from central plants and multiple utility service from a central plant. The section on regulations carries standards for accepted practice in the design, installation and operation of equipment for storage and handling of l. p. g., and for shipping by rail, as motor freight and on vessels.

Recognizing that many of the methods and practices described have been suspended or in some manner altered in order to adapt operating practice to the demands of war, the publishers state that the book was written for peacetime operation and the principles set forth are those which have been considered by a board of experts as the best methods to follow under normal conditions. In preparing their third edition the publishers have had the assistance of an editorial advisory board comprising many recognized authorities in the liquefied petroleum gas field. The third edition of the "Handbook of Butane-Propane Gases", can be bought through NATIONAL PETROLEUM NEWS at $5 per copy.

* * *

Welding Instructions Revised

The American Welding Society has published a new tentative standard entitled "Code of Minimum Requirements for Instruction of Welding Operators, Part A—Arc Welding of Steel 3/16 to 3/4 ins. Thick". It is a revision of the code issued by the society in 1941 and adopted by the War Production Board for use in defining an accredited school of welding.

The instructions presented apply primarily to persons who have had little or no prior experience of training as welding operators. This code, a 68-pg. booklet, is available at 50c a copy from the American Welding Society, 33 W. 39th St., New York.

NPN SEMI-ANNUAL SUBJECT INDEX

Of Refining Technology Articles

January-June, 1942

Index No.	Subject	Issue	Page
092.	*Technical Problems of the Petroleum Industry: Research.*		
	Growing Role of Synthesis in Supplying Vital U. S. War Needs From Petroleum	April 15	R-115
093.	*Education of the Petroleum Technologist: University and College Courses and Curricula.* (*See also under* 022).		
	Training in Refining Engineering Is Growing in U. S. Schools	March 18	R-92
094.5	*Materials Used in the Petroleum and Related Industries—Fuels.*		
	Heat Requirement Per Bbl. of Crude Run Is Growing Under the War Program	March 18	R-84
213.3	*Density and Volume Relationships: Apparatus for Determining Density, Volume, and Compressibility—Compressibility.*		
	Suggested Standard Method for Calculation of High-Pressure Gas Measurements	June 10	R-180
234.4	*Thermal Decomposition or Cracking (Pyrolysis)—Use of Catalysts.*		
	New Process for Catalytic Conversion of Normal Into Isobutane	June 10	R-194
	Properties of Hydrogen Fluoride as Alkylation Catalyst Described	May 27	R-174
263.	*Volatile Fractions, Including Naphthas, Gasoline, and Benzene.*		
	Ultimate Motor Fuel Will Be Blend of Pure Hydrocarbons, S.A.E. Told	Feb. 4	R-46
	The Effect of Lower-Octane Gasoline On Operation and Maintenance of Cars	March 4	R-78
265.	*Lubricating, Transformer and Switch Oils; Absorption Oils.*		
	Condition of Engine Determining Factor in Examining Used Oils	March 18	R-88
270.	*Specifications for Purchase of Various Species and Fractions of Petroleum and Other Bitumens.*		
	Lubricating Oil Specifications of British Petroleum Mission	Jan. 7	R-10
	British Specifications Revised for Aviation Fuel Base Stocks	April 1	R-102
605.2	*Pipeline Transport—Cost and Capital Investments.*		
	Engineering Economics of Long Petroleum Pipelines	March 4	R-69
615.2	*Pipeline Transportation of Petroleum—Oil Pipeline Design.*		
	Engineering Economics of Long Petroleum Pipelines	March 4	R-69
644.5	*Steel Oil Storage Tanks—Types.*		
	Practical Methods for Storing Volatile Liquids	April 1	R-105
684.2	*Losses of Oil During Storage and Means of Minimizing Losses—"Breathing" and Evaporation.*		
	Lower Heat Absorption of White Tank Paints is Reported to A.P.I.	March 18	R-88
720.1	*Refinery Processes: Theoretical Considerations—Description.*		
	New Process for Catalytic Conversion of Normal into Isobutane	June 10	R-194
720.3	*Catalysis of Hydrocarbons.*		
	Growing Role of Synthesis in Supplying Vital U. S. War Needs From Petroleum	April 15	T-115
	See Supply of Aviation Gasoline Enlarged Through Hydrofluoric Acid Alkylation	April 29	R-131
721.33	*Distillation-Chemical Catalyzers.*		
	Properties of Hydrogen Fluoride as Alkylation Catalyst Described	May 27	R-174
725.3	*Treatment of Distillates To Remove or Inhibit Formation of Gums, Tarry Residues, and Other Undesirable Impurities—Solvent Extraction.*		
	New Lubricating Oil Extraction Solvent Reported to A.I.C.E.	May 13	R-146
726.3	*Decolorizing—Fullers Earth.*		
	Spent Fullers Earth Found Effective in Control of Incendiary Bombs	May 27	R-163
729.6	*Other Refinery Processes—Polymerization.*		
	Trend in Aviation Gasoline Processes Toward Fuels of Fewer Compounds	April 15	R-120
729.7	*Other Refinery Processes—Alkylation.*		
	Trend in Aviation Gasoline Processes Toward Fuels of Fewer Compounds	April 15	R-120
	See Supply of Aviation Gasoline Enlarged Through Hydrofluoric Acid Alkylation	April 29	R-131
729.9	*Other Refinery Processes—General.*		
	Trend in Aviation Gasoline Processes Toward Fuels of Fewer Compounds	April 15	R-120
732.6	*Materials Used in Refinery Construction—Alloys.*		
	Tests Show Effect on Steels in Crack-Coil Tubes of Changes in Chromium Content	May 13	R-147
744.	*Operation and Control of Clarifying and Filtration Equipment.*		
	Correlation of Filter Plant Yields With Lab Results	Feb. 18	R-57
750.	*Specific Products and Their Manufacture.*		
	Refining's Response to War Stimulus Shown In Oil Company's 1941 Reports	April 1	R-99
751.22	*Naphthas-Aviation Fuel.*		
	See Supply of Aviation Gasoline Enlarged Through Hydrofluoric Acid Alkylation	April 29	R-131
753.2	*Lubricants and Related Oils—Motor Oils.*		
	New Lubricating Oil Extraction Solvent Reported to A.I.C.E.	May 13	R-146
759.3	*Other Petroleum Products—Rubber Substitutes.*		
	Manufacture of Synthetic Rubber	Feb. 18	R-51
	Rubber-from-Petroleum Chart	June 10	R-190
762.	*Power Plant and Power Distribution.*		
	Heat Requirement Per Bbl. of Crude Run Is Growing Under the War Program	March 18	R-84
765.	*Testing and Research Laboratories.*		
	New Laboratory is Contribution to Research in Petroleum Field	Feb. 4	R-40
773.4	*Oil Absorption Process for Extraction of Natural Gasoline From Natural Gas—Absorbers.*		
	Performance of Refinery Gas Absorbers With and Without Intercoolers	April 29	R-134
773.7	*Oil Absorption Process for Extraction of Natural Gasoline From Natural Gas—Plant Operation and Control.*		
	Increasing Butane Recovery at Gasoline Plants from Existing Equipment	May 27	R-170
778.1	*Weathering, Blending, Stabilizing, Storing and Shipping of Light Condensates—Weathering.*		
	Practical Methods for Storing Volatile Liquids	April 1	R-105
801.	*Utilization of Naphthas: Benzine, Gasoline and Engine Distillates.*		
	Debate Effects of Cut in Anti-Knock Value of Fuel on Car Maintenance	Jan. 21	R-18
803.	*Utilization of Lubricating Oils and Greases.*		
	Development of Ball Bearing and Roller Bearing Greases	Jan. 21	R-22

Index No.	Subject	Issue	Page
815.	*Power Development With Internal Combustion Engines of Explosive Type, Using Light Distillate (Kerosine and Naphtha) As Fuel.* Debate Effect of Cut in Anti-Knock Value of Fuel on Car Maintenance	Jan. 21	R-18
	Ultimate Motor Fuel Will Be Blend of Pure Hydrocarbons, S.A.E. Told	Feb. 4	R-46
815.4	*Ignition Systems.* Effect of Ignition Timing and Anti-Knock Quality of Fuel on Engine Performance	April 15	R-117
815.5	*Fuel "Dopes" and Anti-Knock Compounds.* The Effect of Lower Octane Gasoline On Operation and Maintenance of Cars	March 4	R-78
817.	*Power Development With Diesel and Semi-Diesel Types of Oil Engines.* Diesel Versus Steam Locomotives	May 13	R-156
	Additives to Improve Cetane Number of Diesel Fuels Reported to S.A.E.	Feb. 4	R-43
830.1	*Theory and Principles of Lubrication.* Effect of Rough Surfaces on Bearing Lubrication	March 18	R-90
835.1	*Lubrication of High Speed Machines.* Effect of Rough Surfaces on Bearing Lubrication	March 18	R-90
841.	*Use of Petroleum Products in Paving and Road Surfacing.* Wartime Requirements for Asphalt	Feb. 18	R-60
890.	*Miscellaneous Uses for Petroleum.* Spent Fullers Earth Found Effective in Control of Incendiary Bombs	May 27	R-163
903.	*Economics of Petroleum Refining.* Wartime Refinery Process Plants To Be Standard Design	March 4	R-67
	Refining's Response to War Stimulus Shown in Oil Company 1941 Reports	April 1	R-99
937.	*Plant Maintenance.* Many Applications for Welding In Refinery Maintenance	Feb. 4	R-34

Large OIL OPERATORS

are using the Brooks LOAD LUGGER for *sludge handling*, because it makes the job easier, saves man-power, and requires fewer trucks.

One-piece, leak-proof buckets are filled at the tank then picked up, hauled away and dumped, as shown below. This hydraulic hoisting unit fits on any standard chassis.

Try this simple method . . it pays!

Write for FOLDER

Distributors in all Principal Cities
2009 Davenport Road

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

NPN SEMI-ANNUAL AUTHOR INDEX

Of Refining Technology Articles

January-June, 1942

Author	Title	Issue	Page
Abson, Gene—Wartime Requirements for Asphalt		Feb. 18	R-60
Aldag, Robert—Diesel versus Steam Locomotives		May 13	R-156
Clark, C. L.—Tests Show Effect on Steels in Cracking Coil Tubes of Changes in Chromium Content		May 13	R-147
Egloff, Gustav—Trend in Aviation Gasoline Processes Toward Fuels of Fewer Compounds		April 15	R-120
Fraser, H. M.—Development of Ball Bearing and Roller Bearing Greases		Jan. 21	R-22
Heidner, R. C.—Effect of Ignition Timing and Anti-Knock Quality of Fuel on Engine Performance (also by C. W. Phelps and M. L. Smitley)		April 15	R-117
Hill, Edgar G.—Engineering Economics of Long Petroleum Pipelines		March 4	R-69
Jackson, R. M.—Performance of Refinery Gas Absorbers With and Without Intercoolers (also by T. K. Sherwood)		April 29	R-134
Jones, G. C.—Correlation of Filter Plant Yields With Lab Results		Feb. 18	R-57
Jones, G. C.—Spent Fullers Earth Found Effective In Control of Incendiary Bombs		May 27	R-163
Katz, Donald L.—Suggested Standard Method for Calculation of High-Pressure Gas Measurements		June 10	R-180
Larson, D. E.—Practical Methods for Storing Volatile Liquids		April 1	R-105
Murphy, George B.—Refiners are Responding to the War Demand for Larger Volumes of Aviation Gasoline		Jan. 7	R-1
Murphy, George B.—The Government's Synthetic Rubber Program Adds to Refiners' Wartime Problems		Jan. 21	R-17
Murphy, George B.—Big Expansion in Refining Lies Ahead		Feb. 18	R-49
Murphy, George B. — Manufacture of Synthetic Rubber		Feb. 18	R-51
Murphy, George B.—Transportation Seen as Major Problem By Eastern Refinery Technologists		March 4	R-65
Murphy, George B.—Outlook for Mid-Continent Oil Companies in Supplying Wartime Products		March 18	R-81
Nigh, G. W.—Many Applications for Welding In Refinery Maintenance		Feb. 4	R-34
Phelps, C. W.—Effect of Ignition Timing and Anti-Knock Quality of Fuel on Engine Performance (also by R. C. Heidner and M. L. Smitley)		April 15	R-117
Sherwood, T. K.—Performance of Refinery Gas Absorbers With and Without Intercoolers (also by R. M. Jackson)		April 29	R-134
Smitley, M. L.—Effect of Ignition Timing and Anti-Knock Quality of Fuel on Engine Performance (also by C. W. Phelps, and R. C. Heidner)		April 15	R-117

BLACKMER
Nation-Wide
PUMP-ENGINEERING
· SERVICE ·

"Men who know Pumps"

. . . ARE AT YOUR SERVICE

When new plants are built, or present equipment is being redesigned for the production of essential war materials, new pumps will be needed.

Save time. Submit your pumping problems to our engineers. Bulletin No. 302—"PUMP ENGINEERING DATA"—usable tables on pumps and piping, recently issued. If you would like a copy write Blackmer Pump Company, 2029 Century Avenue, S.W., Grand Rapids, Michigan.

Serving the petroleum industry for 40 years

Capacities 5 to 700 GPM. Pressures to 300 psi.

BLACKMER Rotary PUMPS
"BUCKET DESIGN"—SELF-ADJUSTING FOR WEAR

INDEX TO ADVERTISERS

Technical Section

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

American Meter Co. R-329
Badger & Sons Co., E. B. .....
Blackmer Pump Co. R-340
Brooks Equipment & Mfg. Co. R-339
Erie Bolt & Nut Co. R-336
Kellogg Co., M. W. R-325
Kimble Glass Co. .....
Lummus Co. ..... Insert Opp. Page R-332
Monsanto Chemical Co. .....
Petroleum Rectifying Co. of Calif. R-321
Phillips Petroleum Co. .....
Sun Shipbuilding & Dry Dock Co. R-323
Taylor Instrument Companies .....
Universal Oil Products R-331

Contents

Technical Section

★

SEPTEMBER 30, 1942

Reduce Valve Requirements in Designing Wartime Plants, Refiners Told R-295

29 Places to Save Critical Materials in Building Wartime Refineries R-297

Plastics Are Substitute Materials in War-Time Refineries R-301

Petroleum Pitch Is Found Effective in Combating Magnesium Fires R-307

Application of Corrosion Resistant Alloys to Natural Gasoline Plants—By B. B. Morton R-308

How Germans Blackout Refineries Is Told to W. P. R. A. Technical Group R-314

Cycle Timers On Houdry Unit Board Show How Catalyst Cases Are Functioning R-315

Oil's New Double Barrel War Plants—Produce Materials For Both Aviation Gasoline and Synthetic Rubber R-316

Oil's Research Put on Wartime Footing To Produce More and Better Products R-318

Standard Method Is Proposed for Testing Crankcase Oils for "Varnish Deposits" R-324

Chemical Aspects of Synthetic Rubber R-330

Importance of Proper Desalting of Crude Shown In Photomicroscopic Study R-333

New Books for the Oil Man R-337

NPN Semi-Annual Index R-338